

**TEACHING NATURAL SCIENCE (NS) USING COMPUTERS: A  
CASE STUDY OF GRADE 8 EDUCATORS IN THE UMZINTO  
DISTRICT.**

by

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**STUDENT NUMBER: 9903967**

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### (i) ABSTRACT

The purpose of this study is to investigate the impact of computer technology on teaching Natural Science (NS) in grade 8 classes. Computer technology is the powerful and influential tool in teaching and learning situation. When it is used appropriately it will support the NS educators in their teaching of NS. Indeed computer technology could be used to redress the inequalities of the past, especially in the teaching of Natural Science as they offer the educators whether in rural or urban area a common base of knowledge and experience.

The term computer technology is used interchangeable with the term Information and Communication Technology. The term computer technology has the different meanings from the different authors but in these meanings that they gave, there are similarities that computer technology is a tool used for developing, implementing and evaluating the teachings aids. There are different ideas about the impact of computer technology on teaching NS because other authors in their studies state that it has a positive impact yet others state the negative impact of computer technology. Those they state the positive impact look at a dimension of the developing the teaching skills, creative thinking and problem solving skills in education. The other authors state the negative impact of computer technology look on the dimension that it is too early to conclude that computer technology has a good impact because some of the educators in the teaching field are not well trained to teach using computers. They also state that computer technology will have negative impact on teaching because in the schools where these educators worked there is no follow up after they attended the workshops to look that are they do what they are trained to do.

The findings show that computer technology has a positive impact because 75% educators have a full understanding of computer technology and they apply in their teaching and learning of NS. This means that these results are supporting ideas of these authors that they were stating that computer technology has positive impact. There were few educators that they have no understanding of teaching using computers so they have

a negative attitude of computer uses in teaching. These educators are supporting the views of the authors that in their studies they shown the negative side of computer technology in teaching.

This study concludes that the Dinaledi project and the department of education must make it sure that they do the follow up that computers are used purposeful to schools that they have them. The trainings workshops must be long so these educators will acquire these teaching skills thoroughly.

**(ii) DEDICATION**

My special thanks go to my parents (Mr and Mrs Matolo), my Brothers, my Sisters, my Nephews and to my son.

To my late sister. To you “ **Nontsikelelo, Faith Matolo**” I know that you would appreciate what I have accomplished.

### (iii) ACKNOWLEDGEMENTS

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I would also like to place on record my appreciation to the following people.

- All the principals in those schools that were used in this study for their patience and also their support.
- All the NS educators in those schools who helped me with answering the interview questions.
- All my friends whose love and understanding gave me the essential support and space to complete this study.

(iv) DECLARATION

I Patrick Khanyiso Matolo, declare that this dissertation is my own work, and has not been submitted previously for any degree at any University.



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Researcher: P.K. Matolo

## LIST OF TABLES

Tables	Table Numbers	Page Numbers
1. Educators definition of computer technology	Table 1	83
2. Schools using computers for teaching NS	Table 2	85
3. Computer usage in schools	Table 3	90
4. Challenges of teaching using computers	Table 4	96
5. Qualifications of the interviewees	Table 5	97
6. Experiences of the interviewees	Table 6	98
7. The gender of the NS educators that were interviewed	Table 7	98
8. Age of the NS educators that were interviewed	Table 8	99

## TABLE OF CONTENT

	Page Numbers
i Abstract	i
ii Dedication	ii
iii Acknowledgements	iii
iv Declaration	iv
<b><u>CHAPTER ONE: INTRODUCTION</u></b>	
1.1. Introduction	1-2
1.2. Statement of Purpose	2
1.3. Critical Questions	2
1.4. Rationale	2-7
1.5. Review of the Literature	7-12
1.6. Methodology	13-19
1.7. Theoretical Framework	19-24
<b><u>CHAPTER TWO: LITERATURE REVIEW</u></b>	
2.1. Introduction	25-26
2.2. Computer technology on teaching and learning	26
2.3. Impact of computer technology on teaching NS	27
2.4. Computer usage in education	28
2.5. Educators attitude on teaching using computers	29-34
2.6. Computer usage in classroom in Australia	34-35
2.7. Computer technology in Primary schools Eastern Cape	35-37
2.8. Computer technology in curriculum	37-39
2.9. Computer technology in teaching mathematics and science	39-41
2.10. Observations in teaching mathematics and science	41-43
2.11. Criticism of computer technology in teaching and learning	43-44
2.12. Challenges of computer technology on teaching	45-47
2.13. Negative impact of computers on teaching	48-57
2.14. Conclusion	57
<b><u>CHAPTER 3: THEORETICAL FRAMEWORK</u></b>	
3.1 Introduction	58
3.2 Critical thinking curriculum model	69
3.3. Technology component	69
3.4. Educational component	69
3.5. Assessment component	70
3.6. Community component	70
3.7. Conclusion	71

## **CHAPTER 4: RESEARCH METHODOLOGY**

4.1.	Introduction	72
4.2.	Ethical Guidelines	72-74
4.3.	Limitation of the study	74-75
4.4.	Sampling procedure	75-76
4.5.	Instruments used to collect data	76-78
4.6.	Research Methods	79-81
4.7.	Conclusion	81

## **CHAPTER 5: FINDINGS**

5.1.	Introduction	82
5.2.	Respond on definition of computer technology	82-83
5.3.	What computer technology do you have in schools	83-85
5.4.	How often do you use computers	85-86
5.5.	What impact computers do they have in teaching NS	86-87
5.6.	How do you feel to teach NS using computers	87
5.7.	Impact of computer technology in teaching strategies	88-90
5.8.	How did you use these computers in teaching	90-91
5.9.	Aim of teaching using computers	91
5.10.	Challenges of teaching using computers	91-96
5.11.	Qualifications of these NS educators	96-97
5.12.	Experiences of the NS educators in teaching using computers	97-98
5.13.	The gender of these participants that were interviewed	98-99
5.14.	Conclusion	100

## **CHAPTER 6: INTERPRETATIONS OF THE RESULTS**

6.1.	Introduction	101
6.2.	Interpretations of the definition of computer technology	101-102
6.3.	Interpretations of the computer impact in teaching NS	102-103
6.4.	Interpretations for the qualifications and experiences	103
6.5.	Interpretations for positive impact of computer technology	103-104
6.6.	Interpretation on NS educators that are computer literate	104
6.7.	Interpretations about trainings workshops for the NS educators	104-105
6.8.	Conclusion	105

## **CHAPTER 7: RECOMMENDATIONS AND CONCLUSION**

7.1.	Introduction	106
7.2.	Recommendations	106
7.3.	Recommendations to NS educators	106
7.4.	Recommendations to the schools	107
7.5.	Recommendations to the Tertiary institution	107
7.6.	Recommendations to the department of education	108

7.7. Conclusion

108

**BIBLIOGRAPHY**

**109-118**

## **CHAPTER ONE**

### **1.1 INTRODUCTION**

This chapter draws particular attention to describe and explain the impact of using computer technology in teaching Natural Science (NS) in grade 8 classes in Umzinto area of South Coast of Kwa-Zulu Natal. As South Africa moves from the apartheid era to the democratic period, it carries all the baggage from the past such as inequalities that existed in education. The priority for the new National Government is to transform the old education, system hence Outcomes Based Education was introduced in 1997. It aimed to change the role of the educators and promote learners as active participants. The policy on the use of computer technology in education was formulated in the white paper on education and training (1997). This policy explains how computer technology should effectively be used to support education and training within the goals of transformation, reconstruction and development of South African education.

In this chapter the researcher firstly defines what computer technology means, it refers to the behavioral science approach on teaching and learning to make use of pertinent scientific, technological methods and concepts developed in psychology, sociology, communication, linguistics and other related fields. According to Sampath, Panneerselvam and Santhanam (1994:31), “Computer technology in education is a wide sense to understand because it includes the development, application and evaluation of systems, techniques and aids in the field of teaching and learning”. In teaching and learning computer technology is used as an aid to improve the process of human teaching and learning.

According to the views of Venkataiah (1996:2) “computer technology is the integrated process that involves people, procedures, ideas, devising, implementing, evaluating and managing solutions to the problems that are involved in all aspects of learning and teaching mathematics and science”. In education, computer technology is the technology that prescribes the design of instructional materials for structural learning and interactions

for maximum benefit. In this study the researcher was investigating the impact of computer technology and how computer technology used in education for teaching Natural Science (NS) in grade 8 classes at four schools in the Umzinto area.

## **1.2. Statement of purpose**

**Teaching Natural Science (NS) using computers: A case study of grade 8 educators in the Umzinto district.**

## **1.3. Critical Questions**

1. What computer technology do educators use to teach NS?
2. How do educators use the computer technology in teaching NS?
3. What impact does computer technology have on educators that are teaching NS?

## **1.4 Rationale**

The main aim of conducting this study is because the researcher wants to know how the Natural Science (NS) educators are maintaining and managing the discipline in teaching NS using computer technology. The researcher is concerned about this study because he is interested in knowing how NS educators in these schools use computer technology to maintain or improve the performance and progress of the learners in this subject. The computer technology is a new tool in the science curriculum for teaching; so the researcher wants to know how the NS educators use computer technology to conduct experiments in the absence of appropriate laboratory facilities in other schools. This study was aiming to reveal the criteria that NS educators use to conduct NS assessment using computer technology and to find out whether there is any link between the methods that they used to teach NS and with the goals of the curriculum planners. The researcher was concerned about this study because he wants to know what skills are acquired and developed by NS educators and how they apply those skills in teaching NS using

computer technology and its advances. Burke (1987) said, “Computer technology in teaching NS is an important tool to motivate and encourage the educators to develop a new attitude in teaching”. The researcher conducted this study because he wants to find out whether the Dinaledi project influences their teaching styles. Dinaledi project is a project that is working with the Department of education, Department of communication and South African Airways (SAA) to offer schools with computers and it is targeting or targeted those schools that have low performance in Mathematics, Science and Technology. In those schools it forces them to teach these particular subjects in higher grade and in NS and in technology it force the educators to attend the training workshops that they offers the schools that belong to them. This project is a national project that is more focused in developing educators and learners in the usage of computers for teaching and learning. The researcher was aiming to find out how the educators manage problems if they are there that are related to the availability of only one computer in a school.

The researcher was interested in conducting this study because he wants to know whether the skills that NS educators use enable the NS curriculum to be successfully implemented by using computer technology and are able to lead them to achieve the curriculum goals. The researcher wants to know that how these NS educators are re-trained and how often they attend the workshops is because he wants to know if the workshops and trainings are practically (trained using computers) or theoretical (teaching theories of how to teach using computers) and how they are purposefully in developing them and make them to be creative in teaching NS. Burke (1987) said “Computer technology is an important tool to teach NS if it provide the good and better understanding to the educators to conduct the experiments that are dangerous if they cannot be conducted to the laboratory. Through the point that Burke stated the researcher became more interested conducting this study because as a physical science educator there are chemicals that are dangerous like hydrogen sulphide that is inhaling so if the experiments are conducted using the computers it will be easy. This study was aiming to reveal how the NS educators assess themselves to see their progress and their mistakes in teaching using computers.

In conducting this research, the researcher want to know that the usage of computer technology in teaching Natural Science that is aiming to make the curriculum 2005 to be successfully or is to make NS educators to become creative and more developed in their teaching strategies. The researcher was concerned about this study because in the National Curriculum Statement (NCS) for NS (2001) said “Natural Science will be able to contribute towards educators and learners by giving them the opportunity to develop and apply specific skills to solve problems using computer technology”. The NCS (2001) said “Technology especially computers can be used to create some problem solutions in science curriculum because it will give the educators the knowledge and skills that enable them to solve problems for the purpose of producing products, processes and services that satisfy the people needs”. The researcher conducted this study because he wants to know the problems that the NS educators come across them in teaching using computers and how they manage to solve them and what are their views on teaching Natural Science using the computer technology. The researcher was interested to conduct this study because the researcher want to find and to know the strategies the NS educators uses in teaching and how they create the integration with the learners.

The aim of conducting this study was because at the end the researcher wants to compile a document that will be send to the curriculum planners and to the Dinaledi project to show them the views and the ideas of NS educators about the computer usage in teaching NS since computer usage was involved in the science curriculum. This study was aiming at revealing that if the involvement of computers in the teaching and learning become not successful to achieve the goals that were expected in the designation of the curriculum what they will do. The purpose of this study was also to inform the Dinaledi project and curriculum planners about the extent to which their idea of involving computers in teaching is successful for NS educators. The researcher conducted this study because he wants to know how the NS educators accommodate the learners that are working with a fast pace in using computers together with those that are working with a slow pace. The researcher conducted this study because he wants to know that computer technology in teaching is a new tool so how these NS educators were assessed about their performance

and what type of skills they developed and gained since technology is always developing with the changing of time.

The researcher was interested in conducting this study because he wants to reveal the perceptions and the views of NS educators about teaching NS using the computers. This study was aiming at revealing the challenges and feelings of NS educators that they face with it in using computers in teaching by looking at those educators that they have 20 years in teaching profession as most of them might be computer illiterate. The researcher in this study looked at the experiences of the old educators in the teaching field and wants to know how they feel about the new NS educators that are computers literate and how is the relationship between them and how Dinaledi project accommodate those educators that are computer illiterate. In the Third International Mathematics and Science Study (TIMSS) Howie, (1997) find that South African educators are not performing well in science as compared to other countries, so the researcher did this study because his aim was that, since in the science curriculum computer technology was involved and used are the results will be the same as before?. The researcher was also aiming to know that as computer technology involves in the curriculum to maximize the teaching opportunities for NS educators or is to improve the achievements in science among African learners, does it do since it was implemented.

The educators that teach NS using computers have disk that are having the whole part they are suppose to each e.g. if the teacher will going to teach about electric current there is a disk that has the part of electric current so the researcher want to know that how they do the elaborations or clarifications if the learners are not fully understand. The researcher concerned about this study because he wants to know that since other educators did their teaching qualifications at colleges where they were never did any technology courses how these educators teach NS use computer technology and how they get the support from the government and to the curriculum planners. The researcher conducted this study its because he wants to know that the usage of computer technology in teaching NS have an impact to the educators that might be computer illiterate and which attitude does it create to them on teaching NS using computers. The researcher was

interested in conducting this study because he want to look at the science curriculum that was implemented to use computer technology in teaching NS that where were the gaps in the designation of it and how it was offered to support to the NS educators?

The researcher was interested to conduct this study because he want to state clearly the ideas and views of NS educators about this new curriculum of using computer technology in teaching Natural Science. The researcher conducted this study because he was interested to know the ideas of the different authors about the usage of computer technology in teaching NS in grade 8 classes and its impact. The researcher was interested in conducting this study because he found that the authors have different views about the usage of computer technology in teaching NS where others they have a negative impact and others have a positive impact so my study will able to show how and why they have those different views. The researcher was interested to conduct this study because he wants to know that is the computer technology is the one of the factors that are driving the progress in the 21<sup>st</sup> century and also it will able to transform the way educators use the computers to teach NS. In the study that was conducted by Mkhize (2003) found that the usage of computer technology (computers) has a negative impact in teaching NS in grade 8 classes because the educators did not have a good and a basic understanding of using it and this resulted in negative attitude in NS educators to teach using computers. In her study she also found that the computer technology (computers) was having an impact because the performance of the learners was not good compared to the previous one without computers.

The researcher was interested conducting this study because he wants to go further with the study that was conducted by Wright and Bakia (2000) where this study was looking at the computers in teaching mathematics and science. It was the unresolved study because they lack agreement on whether computer technology (computers) in education is used to improve the teaching of mathematics and science or how it measurably improves teaching in mathematics and science. The researcher conducted this study because he wants to go beyond to those boundaries that stopped them to find out the agreement that computers have an impact in teaching or not and if no why they don't have it and if yes

what type of impact they have. In the research that was conducted by Mkhize (2003) on the use of instructional technology in education in teaching of Natural Science it was unresolved study because the results of the study indicated that educators are performing poorly in teaching Natural Science using computers, but she never get what was the cause that make these educators to perform poorly. In this study the researcher want to go beyond the results of the above researcher in order to get what seems to be the main cause of making educators to perform poorly in using computers in teaching Natural Science.

### **1.5. LITERATURE REVIEW**

In the literature review of this study the researcher first look the definition of the term computer technology, this term Computer technology (CT) is used interchangeable with term Information Communication Technology (ICT) in South Africa. In South Africa they are also using the term educational technology which still used interchangeable with computer technology. The term computer technology (CT) is more focused on the study of computers and the term information communication technology is more focused on how computers are used in education for teaching and learning. In other countries like USA they use the term educational technology, Britain and Australia they are using the term instructional technology meaning the same thing with the term computer technology. “The term computer technology means the combination of telecommunications and computing to obtain process, store, transmit and output information in the form of voice, pictures, words and numbers” (Venkataiah, 1996). In USA, Britain and Australia they use the term instructional technology, it means the matters concerned with the furtherance of computer science and technology, design, development, installation and implementation of information systems and applications. The researcher conducted this study to look how computer technology had an impact in teaching the NS or how does it influence the teaching styles of the NS educators. The researcher looked at the impact of IT in teaching NS he looked under the perspective that is it used to improve the quality of teaching and learning of NS in grade 8 in terms of these 3 key areas skills, content and outcomes.

Burke and Rumberger (1987) said “In teaching NS using computer technology has a negative impact because it is not an effective tool to achieve the teaching and learning outcomes”. Their ideas is similar to the idea of the study of Rowntree (1991) where he found that computer technology has a negative impact in teaching because it does not help educators to become creative in thinking and to develop more strategies in teaching but it is shaped to achieve educational goals and resulting the NS educators to work on a narrow focus in teaching. The ideas of Burke and Rumberger (1987) and Rowntree (1991) are similar because they were looking at the negative side of using computer technology in teaching NS where the point of similarity was that computer technology is just used in teaching for one purpose only to achieve the educational goals and not focused to the development of the curriculum like the to develop the educators teaching strategies, creative thinking and the assessment skills. Through their idea that they come with it the researcher agree with them, because it is relevant to other data that was collected.

In the study that was conducted by Singh and Sudarshan (1996) they found that in teaching NS using computer technology has a negative impact because it does not support NS educators in terms of classroom management. The idea that they were raising in their study is that the NS educators are not well trained to teach NS using computer technology or they are computer illiterate so they can't be able to get and know some of the new management skills since they are dealing with the individual learner in the classroom situation. Grabe (2001) and Romiszowski (1988) in their studies on the impact of using computer technology in teaching grade 8 classes, they found that the NS educators in grade 8 classes are just using computer technology without having a full understanding of teaching strategies that they showed in teaching NS using computers and this result in making them to conduct the interpretations in their teaching where sometimes their interpretations becomes different to the views of the author on that particular chapter. Through what they stated it shows that they have a negative attitude on the usage of computers in teaching Natural Science (NS) because they also state that even the educators experience and knowledge of teaching NS is not the same as what the

authors said in their science textbooks. Their ideas show that they have a negative attitude towards the use of computers in teaching NS because they highlight that in teaching of NS other NS educators have a problem of content and skills of teaching this subject and to use the computers.

In the study that was conducted by Knezek (1996) in the International Association for the Evaluation of education achievement of computer technology (computers) in education project (IEA Comp ED), Computer technology in Education and Children project (ITEC) and Young Children Computer Inventory project (YCCI) they found that computer technology (computers) has a negative impact on teaching Natural Science because educators are insufficiently trained to use computers successfully and not all educators are using computers to teach NS. In the study that was conducted by Watts and Bently (1994) they found that computer technology in teaching NS has a positive impact on teaching because it give the NS educators the opportunity to witness and to perform or to conduct the experiments that might be dangerous for them to conduct in the laboratory.

The agreement of them is similar to the agreement of the study of Perkins and Schwartz (1995) where they find that computer technology has a positive impact in teaching NS because it improve the quality of NS educators and make the teaching of NS to become relevance. They also have the same idea that computer technology improves the teaching skills and the higher standard of educators to have an access to the new information and to develop new skills. In their studies they have a similar idea that that computer technology will have a negative impact in teaching if the educators are not re-trained and given the workshops for motivating them so that they can use the computer technology successfully in teaching. They are also have similar ideas in their studies that IT might have a negative impact in teaching if the educators are not assessed by the department of education to see if they use the computer technology purposely and use it in teaching to achieve the expected curriculum goals in mathematics and science.

In the research that was conducted by Venkataiah (1996) where it was looking at the impact of teaching mathematics and science using computer technology where she was

more focused on the assessment criteria but her study was unresolved. She stated that computer in teaching those subjects in the senior phase might have impact since technology in the curriculum is still new so she said is still early to judge that computer technology have a positive or negative impact in teaching those subjects and used to the curriculum.

According to the study of Singh and Sudarshan (1996) they found that in teaching mathematics and science computer technology have impact because it include far domination of educators by those whose power have been augmented through computer technology. Through what they stated they were looking at the self-esteem of the educators that are teaching using the computer technology where they found that some educators lose their self esteem and confidence as they are computer illiterate. The computer technology has an impact on teaching NS in the grade 8 classes, because they give a challenge to educators as they are supposed to use computer technology in this grade for drill and practice part of the rest of school time were spent in classroom and other objective. It give educators a challenge to use the computer technology in teaching because it needs the educators to develop the higher order of thinking skills for making the NS grade classes to be effective and creative in learning.

Computer technology has a negative impact in teaching NS because it opens the gap between the best performing learners and poorest performing learners. The researcher said this because there are learners that have computers at home so it become easier for them to work at a fast pace during the process of teaching and learning using computer technology as they get some practices at home than those who don't have computers at home. Computer technology in teaching has a negative impact on teaching NS because the teaching skills that educators gain through their experiences are strongly influenced by the usage of computer technology and this result some difficulties to educators to adapt and use the new teaching strategies and leave out the old one's and this also affect the pass rate of learners. Through this point the researcher will look that in teaching using computer technology it shift the priorities of NS educators to be more intellectual and cognitive direction and it undermine the age graded structure but it would probably not

otherwise make substantial changes in the curriculum. Computer technology in teaching NS has an impact because it challenges the educators that are poses in using computer technology to face with challenges that they become irresponsible for them to work in schools.

The classroom techniques must effectively in ways that help all educators to reach computer related goals. Singh & Sudarshan (1996) stated that 'computer technology in teaching NS has an impact, because it gives educators to confront on the basic challenges of the impact of computer technology on the curriculum and instruction. Through this point or in their study they found that computer technology has an impact because it becomes more sophisticated and as they retrieve information even more efficiently. In the survey that was conducted by Market Data Retrieval (1999) on the new educators that were using computer technology in teaching NS, he find that only one third of NS educators are using computers to teach NS and they integrate computers in their classrooms. To elaborate what he is saying his survey is supported by the study of Venkataiah (1996) where he said 'New educators are ready to use the new resources like computers since they are familiar on using them from the higher institutions'.

Grabe (2001) in his study found that computer technology in teaching mathematics and science has a positive impact because by teaching using it make teaching and how to teach become able to influence the classroom tasks and activities that should help the teacher to make decisions about whether or not you want to devote precious school time to a specific use of technology. The computer specialist found that in teaching NS and mathematics using the computers is implementing the effective classroom activities that make the teacher to understand the connection between teaching tasks and the mental activities of the learners. Grabe (2001) said "Computer technology (computers) have a positive impact on teaching science and mathematics because it requires the teacher to go beyond reception of information to cognitive skills involving judgments, interpretation and applications". In the research that was conducted by Mkhize (2003) she found that computer technology has a negative impact in teaching NS because educators are not well trained to use the computers to teach NS and it becomes the starting point for greater

problem in educators to conduct the better planning, implementing and evaluating the kinds of innovation to make this curriculum to be successfully.

Sewell et al (2000) in his study found that South Africa is not unique in having to grapple with the problem of inadequately qualified science educators; indeed the United States of America is concerned about the poor performance of its young people in science and in searching for new education of paradigm. Woolnough (1994) in his study found that science educators are knowledgeable, competent and enthusiastic in their subject and they must make the science more relevant, accessible and interesting to learners. To this point he said, he was looking after the NS educators that were trained on how to use computer technology (computers) in teaching NS. In this study the point is that if the natural science educators can be well trained they can able to prepare good grade 8 and 9 learners for physical science because solid science background will be advantageous for learner's future.

The study that was conducted by Wright and Barkia (2000) in these countries Barbados, Chile, Costa Rica, Egypt, Jamaica and Turkey they found that computer technology (IT) has a positive impact in teaching and learning because it enhance the teaching skills of subject matter of the various curricular offered. In their findings they found that IT skills are more integrated into the existing schools curriculum in these countries and it work effectively as they were used to achieve the educational goal. So Wright and Barkia (2000) what they found in these countries is exactly the same to what I was looking at in terms of looking the impact of computer technology in teaching. I looked at under the 3 key areas that was the content, skills and pedagogy and in his study they got 2 of these key areas that were the skills and the pedagogy.

## 1.6. RESEARCH METHODOLOGY

The methodology that the researcher had used in this study was a qualitative methodology because the researcher was aiming to go in depth in collecting the information or data in a small group of NS educators that are using the computer technology. The researcher had found these NS educators that were using computer technology in teaching NS by targeting the schools that were using computers in teaching and also to the schools that were offered the computers by the Dinaledi project. The researcher had chosen this methodology because it was aiming reveal the vision and ideas and views of NS educators in depth by looking their behavior, attitude and their perceptions on using computer technology in teaching NS in these schools. As the researcher had chosen this methodology it was because this methodology relies largely on the interpretive and on the critical approaches to the social science (Neuman, 2000).

The researcher had used the qualitative methodology; Neuman (2000) said “Qualitative researchers used the alternatives to grounded theory”. As the researcher decided to use this methodology it was because by using it the researcher will develop the theoretical framework during the data collection. Strauss & Corbin (1990) said “The grounded theory in qualitative research method used as a systematic set of procedures to develop and inductively derived theory that is faithful to the evidence. Qualitative methodology is a more inductive method and it means that it is used to build from the data or grounded in the data collected (Neuman, 2000). The researcher used interviews and observations in the data that was collected from 3 NS educators in 4 different schools that were using computers in teaching and with those that were offered computers by Dinaledi project. The researcher chose 3 NS educators in 4 schools at Umzinto because it was aiming to go in depth in collecting the data in a small sample schools that were selected and offered computers by Dinaledi project that at the end they were representing the large number of schools that were using computer technology in teaching NS. The researcher chose these schools because this project was looking the schools that had a poor performance and with those they had a high performance in science, mathematics and technology. Through the semi-structured interviews it’s where the researcher was probing further with

questions as was to go beyond in data that was collected about the use of computer technology in teaching NS.

The researcher was taking these four schools where there were 2 Indian schools and 2 African schools because these were the races that had a large number of schools in Umzinto area and they were also had a large population in this area. The researcher was choosing these schools because they were the schools that were offered computers by Dinaledi project. The researcher chose this methodology it was because it was allowing the researcher to interpret the data by giving it the meaning, translating it and making it understandable as its style was more flexible and encourages the focus to the topic throughout the study. Bogdan & Biklen (1998) said “Qualitative research is plan or design for conducting the research and to enter the investigation as if the researcher knows little about the people and places they will visit and they attempt to mentally cleanse their preconceptions”.

## **1.7. INTERVIEWS**

The semi-structured interviews were used to collect some of the data. This type of interview was used because it was giving the researcher the direct information and concrete evidence from the NS educators that were teaching NS using computer technology. The usage of the semi-structured interviews that were used was allowing the researcher to re-phrase the question if the interviewee were giving the direct information or giving the irrelevant information that the researcher was needing. The researcher decided to use the semi-structured interviews because it had flexible questions as that were allowing the researcher to do the follow up question through the answer that the interviewee gave. Neuman (2000) said “Semi structured interviews allow the interviewer to probe with questions to the interviewee and to conduct a neutral request to clarify an ambiguous answer to complete incomplete answers or to obtain relevant responses”.

The researcher was used semi-structured interviews because it was consisting consist of open-ended questions. Strauss and Corbin (1990) said “Semi-structured interviews offer

topics and questions to the interviewee, but are carefully designed to elicit the interviewee ideas and opinions on the topic of interest as oppose to leading interviewee towards preconceived choices”. The researcher used the semi-structured interviews because he was able to start by identifying the relevance topics and then link them to the issues that were available as they were my base for more specific questions that they will not need to be prepared in advance.

The researcher used the tape-recorder to record or to tape the every response that the interviewees were giving to me. The researcher interviewed these educators 2 times, once a week and also in the following week with the aim of comparing the answers of the first interview if is still the same with what they said in the second interview. The researcher conducted this because he wanted to validate the data that they give me in the first interview where the researcher was doing the comparison between the data that it got to these interviews that was it the same. The researcher conducted these interviews because in the first they were might gave the responses with the aim to impress the researcher so on the second interview its where the researcher was aiming to prove that did their answers that gave are still the same with those of the first interview. The researcher assumed that their answers might be differing because in the first interview they were still afraid to give the lot of information or they might hide other information. The researcher expected this because in the second interview he was going to re-phrase its questions but they were having similar idea with those ones of the first interview. The researcher expected this because even the attitude of the interviewees can make the answers not to be the same.

### **1.8. Observations**

In this study the researcher used participant observation because he wants in the part of the classroom setting. The researcher conducted the observations two time once a week and also on the following week. These observations had take place in the classroom during the teaching and learning process. The researcher conducted these observations its main aim was to validate what they told it in the interviews or these observations were

done a test of the data from interviews. The researcher used this type of observation because the researcher was making sure that the researcher would be carefully not to lose my objectivity. The researcher was the part of the settings and process being studied and the researcher was also makes the carefully observation of what is happening. The researcher was a participant observer the researcher knew the language, phrases and particular vocabulary common in educational situations. This knowledge allows me to get the understanding of the event of the classroom and educational culture from the beginning of phases of the data collection. The researcher had conducted its observations in 4 different schools at Umzinto area with NS educators and these schools were selected as a sample and also because they were the schools that were offered computers by the Dinaledi project.

There were 12 NS educators that were to be observed with the aim of comparing what they said in the interviews was relevant to what I observed in the classes. In terms of observation Neuman (2000) said “In the observation the observer must listen carefully to the phrases accents and incorrect grammar, listening both to what is said and how it is said or what is implied and the observer must record everything in the observation because sometimes something of significance might be revealed”. The researcher had conducted the observations with the aim of validating the data that were collected by means of the interviews.

## **1.9. SAMPLING**

The researcher’s samples were 12 NS educators that were teaching using computer technology in 4 different schools in Umzinto area. There were 3 NS educators that were selected in each school and that were using computer technology for teaching NS. The researcher had chosen these schools because they were computer technology (computers) and educators were using them to teach NS. The researcher had chosen these educators because they were the one they can gave the exactly information that the researcher want and that was suitable for the study. The researcher chose this small sampling because

since it was doing a qualitative research it was suppose to focus in the small group so that it will able to go in depth in collecting the data. In this sample there were 4 Indian educators and 4 African educators. The researcher chose them because in Umzinto area these were the most dominating races. The researcher also chose to use these schools in its study because these schools were offered 23 computers by the Dinaledi project to teach using them.

### **1.10. DATA COLLECTION**

The researcher was collecting the data in these 4 different schools and there were 12 educators that were the source of data. The researcher was collecting the data the instruments that the researcher was using were interviews and observations. The researcher had collected the data with an aim of determining and explaining the impact of computer technology to educators in teaching the NS using computer technology. The researcher was using the semi-structured interviews and the observations (participant observer) to collect the data that is required. The 12 NS educators were the source of data and they were the one that were interviewed. The researcher was collecting data the 12 NS educators were interviewed and observed once a week and also on the following week with the aim of validating the information that they gave in the first interview that was it related or similar to that they in the second interviews and observations. The NS educators were observed before the lesson, during and after the lesson. The data was collected in 4 schools at Umzinto and its where these 12 NS educators were teaching. They were interviewed at their schools and observed in their classes. The researcher was taking a month to collect the data in these 4 different schools.

### **1.11. DATA ANALYSIS**

In this study the researcher was using the qualitative methodology the researcher was using the interpretations in the data analysis in terms of usage of computer technology in teaching NS. Neuman (2000) said “Qualitative research is using the language that has a lot of interpretations in data analysis”. The researcher was doing the data analysis the

researcher was firstly read over the mass of words that were generated by the interviewees and to the observational data then the researcher was able to describe and summarized them with the aim of taking the important points that are linked to its study. In analyzing the data the researcher was involving the organizing, abstracting, integrating and synthesis. The researcher collected the data following its critical questions in terms of analysis the researcher was looking the relationship between the various ideas that the interviewees gave and then analyze the data by looking at their ideas that which critical question they belong to it. In doing the analysis it is where the researcher was able to organize the data and then develop the synthesis that was guiding or directing the researcher to the other sources of data. Strauss and Corbin (1990) said “In qualitative research data analysis are generally presented through words, description and images”. The researcher did the data analysis in this study its where its analysis was leading it to go in depth in the process of making sense in the data that is collected. In the data analysis Strauss and Corbin (1990) recommended that:

***“Researchers should read the data again before analysis to ensure completeness and to generate analytic categories Goetz and Le Compte (1984)”.***

In terms of analyzing the data the researcher was analyze it with the aim of taking out the raw data or the information that was not needed or that was not related to its study. In doing the data analysis the researcher was firstly divide the data that was collected into themes according to its critical questions where at the end the researcher was able to integrate the similar ideas. The researcher was doing the interpretation to the data that had been collected the main aim was to integrate it and then analyze as to make sense on it. The researcher was analyzing the data by looking over the field notes that are taken during the data collection, reading the transcripts and then look at the interviewee comments then it was the time the researcher was breaking it into smaller units. As the researcher was breaking the data into smaller units it’s when it was trying to categorize the ideas of the interviewee according to the researcher’s themes.

In terms of the data analyses the researcher was able to do the transcripts on the data that had been collected where the researcher was re-play the tape-recorder and then write down every thing that was recorded. The researcher will analyze the data its where the researcher was able to use the graphs which they will able to clarify and explain it analysis immediately the researcher was now stating the percentage of educators using computer technology in teaching NS and its the researcher was doing further analysis after it did the graphs where the researcher was able to explain what graph shows. The researcher was analyzing the data by making sure that the researcher was able to take out my biasness and the researcher was analyzing to test that the hypothesis that the researcher was having it was the same with what data collected to those NS educators after it did my analyses.

#### **1.12. LIMITATIONS OF THE STUDY**

. This study was limited because these NS educators were busy preparing the exams and this caused the appointments always postponed. The study was limited because the NS educators that were interviewed and observed refused that the researcher can published other information that they gave. This study was limited because these NS educators give the researcher other indirect information. These NS educators can gave me the indirect information with the aim to impress me and with the aim of thinking that the researcher will expose their weaknesses or their problems to the public.

#### **1.13. THEORETICAL FRAMEWORK**

The researcher used the critical theory because its focus is on the process through which the identities are developed. Since the researcher uses this theory the major objective of this theory was that it focus on the specific ways that the cultural institutions ranging from media to religion to scientific and academic work are used to shape identities, dictating what is accepted as true, normal or acceptable within a culture. The aim of using this theory in this study was that the researcher was aiming to inquiring into what prevents the realization of this enlightenment ideal. The researcher used this theory

because the researcher was aiming to question and challenge the teaching of NS using the computers and to get the simplicity of the world (Torres, 1998). The researcher used this theory because this theory is concern with the discovering and uncovering the views of the NS educators teaching this subject using the computers.

The critical theory involves questioning and challenging the passive acceptance of the way things are, the way things seem to be. The critical theory questions and challenges what is in the process of becoming or what appears to be, or what is most commonly understood to be. The researcher used the critical theory because the main aim was to learn to think, read, write and act critically and to develop the ability to recognize, understand, explain, account for, justify the kinds of judgements, the way in which we make judgements and the standards and criteria we use in making judgements throughout the everyday life (Freire, 1998). The researcher used this theory because it allow to empowered the agents to be able to question, challenge and contribute towards the progressive transformation within the communities, societies and cultures that help to maintain and reproduce every day.

The researcher used the critical theory because this theory argues that a change in subject lead into the new challenges. So by involving the computers usage in schools it means that there are new challenges that they might face with them through teaching NS using the computers. The critical theory used in this study because it explain how modern technology can be redesigned to adapt it to the needs of the free society. Critical theory rejects the neutrality of technology and argues instead that technological rationality has become political rationality (Torres, 1998). Critical theory shows these codes invisibly sediment values and interests in rules and procedures, devices and artefacts that routinize the pursuit of the power and advantage by a dominant hegemony. This theory argues that technology is not a thing in the ordinary sense of the term but an “ambivalent” process of development suspended between different possibilities. The technology is distinguished from neutrality by the role it attributes to social values in the design, and not merely the use, of technical systems. On the view of critical theory technology is not a destiny but a sense of struggle (McCarthy, 1991).

The critical theory holds that there can be at least two different technological civilizations that based on the different paths of technical development. The critical theory that was used in this study because it was interested in the idea of a more just society in terms, not just of all people having equal access to good things of life, but also and perhaps more importantly of people being in cultural, economic and political control of their lives. The critical theory argues that goals could only be achieved through emancipation, a process by which oppressed and exploited people become sufficiently empowered to transform their circumstances for themselves by themselves. Critical theory saw the route to emancipation as being a kind of self-conscious critique which problematized all social relations, in particular those of and within the discursive practices of power, especially technical rationalism (Newman & Holzman, 1993).

The critical theory is used in this study because it is necessary to emphasise that this work is social both in terms of what and how one critiques. In education research critical theory is informed by principles of social justice, both in terms of its own ways of working and in terms of its outcomes and orientation to the community. Critical theory involves strategic pedagogic action on the part of classroom teachers, aimed at emancipation from overt and covert forms of domination. In the research the critical theory is not simply a matter of challenging the existing practices of the system but of seeking to understand what makes the system be the way it is, and challenging that, whilst remaining conscious that one's own sense of justice and equality are themselves open to question (Freire, 1998). Critical theory has always occupied tenuous positions within the traditional disciplines and has always moved restlessly across disciplinary borders, after all when we think of what critical theory has influenced, we must include such diverse disciplines as sociology. Critical theory is by no means merely a province of English studies, and neither need it be should it be. The value of education in the critical theory extends still further beyond the limits of work conducted within the confines of a particular academic discipline and its attendant array of the fields of intellectual inquiry (Torres, 1998).

Critical theory that was used by the researcher in this study assumes that the social reality is historically constituted and that it is produced and reproduced by the people. The Critical researchers recognise that their ability to do so is too constrained by various forms of social, cultural and political domination. The researcher used the critical theory it was because its main task is seen as being one of the social critique, whereby the restrictive and alienating conditions of the status quo are brought to light. The researcher used this theory it was because it focuses on oppositions, conflicts and contradictions in contemporary society and seeks to be emancipator i.e. should help eliminate the causes of alienation and domination. Critical theory is a broad tradition based upon the use of the critiques as a method of investigation (McCarthy, 1991).

Critical theory is whose future, story and interests do the school represents. Critical theory argues that school practices need to be informed by the public philosophy that addresses how to construct ideological and institutional conditions in which the lived experience of empowerment for the vast majority of student becomes the defining feature of schooling (Turner, 1984). As the researcher use this theory it was because its main aim was that since the computers were used to teach NS it will create new forms of knowledge through its emphasis in breaking down disciplines and creating interdisciplinary knowledge. The researcher use the critical theory because the critical question raise questions about the relationship between the margins and centres of power in schools and is concerned about how to provide a way of reading history as part of a larger project of reclaiming power and identity, particularly as these are shaped around the categories of race, gender, class and ethnicity (Torres, 1998).

The researcher used the critical theory because this theory in schools is seen as resources for larger community. In this sense educators and the members of the community become co-owners of the school and doing so collectively determine what is taught, how the school is organised and what role the school might play in the affairs of the community and neighbourhood agencies. The researcher use critical theory because in schools it can be used as a strategic site for addressing social problems and helping students understand what it means to exercises rights and responsibilities as critical citizens actively engaged

in forms of social learning that expand human capacities for compassion, empathy and solidarity. The researcher used the critical theory because in schools educators should construct curricula that draw upon the cultural resources that students bring with them to the school.

The researcher used the critical theory because in schools educators must be able to critically analyse the ideologies, values, and interests that inform their roles as educators and the cultural politics they promote in the classroom. The researcher used the critical theory in this study it was because in education it is informed of principles of social justice, both in terms of its own ways of working and in terms of its outcomes in and orientation to the community. The critical theory operates at and between both the particularities of these teachers observations of actively in this classroom with these children of this day, and the broadly social and political questions of how schools operate and why (Turner, 1984). This theory is a kind of negative but objective judgement which transcends simple fault-finding. The critical theorists refer to active involvement by participants as human agency and believe that despite the influence of oppressive reproductive forces, hope for transformation of society is maintained because of the existence of agency. Critical theory assumes that schools are sites where power struggles between dominant and subordinate groups take place (Freire, 1998).

Critical theory is deeply concerned with the art and practice of teaching; they argue that educators must become transformative intellectuals and critical pedagogues in order to resist the oppression of the dominant ideology and to produce a liberating culture within schools. The critical theory that is used by the researcher in this study believe that its task is to uncover the ways in which dominant ideology is translated into practice in schools and the ways in which human agency mutes the impact of that ideology. Critical theory as it is used in this study is because it is a kind of negative but objective judgements which transcend simple fault-finding. The researcher use this theory it was because it was aiming to uncovers hidden assumptions that govern society-especially those about the legitimacy of power relationships and debunks or deconstructs their claim to authority, (Abercrombie, Hill and Turner 1984). The critical theory used in this study because it

refer to the involvement by participant as human agency and believe that despite the influence of oppression reproductive forces, hope for transformation of society is maintained because of the existence of agency.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

According to the National Commission on education (1996), schools can play a significant role in political, economical and in cultural reconstruction and development in South Africa. Schools will have to offer a greater mix of programs, including those based on the development of vocationally based competencies and skills needed in the teaching and learning of NS using the computers. This chapter is divided into sub-heading where each subheading followed by the description.

Definitions of the terms Computers technology and Information and Communication technology

The term computer technology is an international word which refers to the systems that consists of information through computers, technology in education and technology of education that are used to process the information. The term computer technology (IT) is referring to computers use so if you are using the term computer technology it means you are focusing on the way computers are used. IT (or information technology) is defined as any equipment or interconnected system (subsystem) of equipment that includes all forms of technology used to create, store, manipulate, manage, move, display, switch, interchange, transmit or receive information in its various forms. In this country South Africa we are mostly using the term Information and Communication Technology (ICT) and the term educational technology means the computing and communications facilities and features that are variously support teaching, learning and a range of activities in education.

Information and Communication Technology is the term used to describe exciting and innovative ways to provide lifelong learners with global access to information, learning and support. Information systems that are seamlessly linked to learning support systems, that are enjoyable to use and which enable management. Using ICT in partnership with

the public and private sectors to generate income and assist regional development. Educational technology is the application of research, learning theory, emergent technologies, and child and adult psychology to solving instructional and performance problems (Venkaiah, 1996). There is a relationship between those terms computer technology, Information and Communication Technology because ICT and Educational Technology (Edtech) because ICT and Edtech are referring to the usage of computers in teaching and learning but the term IT is looking at the usage of computers in a broadly perspective.

## **2.2 Computer technology in teaching and learning**

The researcher was looking at the impact of computer technology and looking at the dimension of how computers are utilized in teaching and learning and also in terms of teaching strategies, methods, styles and outcomes. Computer Technology focuses on knowledge, skills and understanding needed to employ information and communication technologies appropriately, securely and fruitfully in teaching and learning, employment and everyday in life. If I am talking about computers it is when I look it as the devices or set of devices that accept data in an appropriate for process and output the results in a useful form. Computers are consisting of the hardware, the parts that you can see and touch and the software are the programs (series of instructions) which enable the system to process the computer data. Computers store the data in files and a file is computer program, a word processing document or the file of data such as account files. Data are the information in a form that can be input to processed and store by a computer. Data is fundamentally any information of interest, but these days, the word data implies a binary (base 2 arithmetic), machine-readable representation of information. ICT focuses on the subject that are taught or studied or the organization being administered, rather than developing pupil's skills with knowledge of technologies themselves.

### **2.3 Impact of Computer technology in teaching NS**

The use of computer technology in teaching Natural Science (NS) has a positive impact because it takes the NS educators from traditional or convectional approaches to instruction and towards the new or reform approaches to teaching and learning of NS. The use of computer technology in teaching NS has been the fact that it gives the NS educators the opportunity to witness or to perform experiments that might otherwise be too expensive, time consuming or too dangerous for them to do in the laboratory. Gallagher (1987) in the study that he conducted on the impact of computers in teaching he find that they have a positive impact because it introduce the NS educators and learners to new ideas that they cannot observe directly.

The use of computer technology in teaching of NS has a positive impact because there are experiments that are done through computers so it means that the NS educators will benefit since their teaching strategies will changed and this will lead and helping the learners to make fundamental changes in their own conceptual framework. In teaching computers are helping the NS educators and learners to observe and to experience the phenomenon in terms of the scientists theories and also science concepts. In teaching NS using computers it gives the educators the visual representations for a set of interrelated (normally unobservable) concepts and guide educators in thinking deeply at more practical level.

In the study that was conducted by Ellington, Percival and Race (1993) they found that IT or computers in teaching have a positive impact because it increases interpersonal skills, leadership skills, creative thinking and problem solving skills. In this study Race (1993) also state that in other dimension computers in teaching has a positive impact because it clarifies and specifies the nature of intended learning outcomes such as the formation of competence descriptors and performance criteria. Perkins, Schwartz, West & Wiske (1995) found that in teaching and learning it provide opportunities for developing new approaches in teaching that are informed by what is being discovered about learning with understanding comes about it.

## **2.4 The researcher's point of view on computer technology in teaching NS**

The researcher disagrees with these results of new approaches in teaching because not only computers that provide the opportunities and developing the new approaches in teaching and learning. I support this point with the views and ideas of Mkhize (2003) My point of critiquing their study is supported by one of West (1995, 76) where he is saying computers also have a negative impact in teaching where he said in France educators are complaining about that not all of them have computers so how they are going to develop the new approaches and there are limited opportunities that they get. West (1995) also stated that the classroom management strategies could not be used because many educators seemed to be unfamiliar with group work individualized classroom management techniques.

In the study that was conducted by Bercker (1986) a cross national survey he found that computers has a positive impact because it makes the science educators to have a positive attitude in using computers for teaching purposes. Bercker (1986) also said it makes them to work fast at a high speed and it help the learners to participate in a lesson as a results it becomes easier to achieve the teaching and learning outcomes very easily. He also found that the main computer users in the elementary and secondary school are mostly the science educators and they are using computers for their lessons than other educators of the other subjects. Barkia and Wright (2000) in the study that he conducted on the use of computers in teaching and learning they found that computers have positive impact in teaching because there are places where there are few textbooks, limited number of educators, huge number of learners so by using computers it can become easier to manage all those problems. Data for their study were collected from the developing countries and it was concerned with the use of computers in education, the findings were that the educators were supporting the usage of computers in their teaching and learning because they are saying that it improve the quality of teaching and learning on three key areas skills, content and outcomes.

## **2.5 The computer usage in education and in classroom**

The other studies that were conducted on the usage of computers in schools suggested that educators could teach differently with the support of computers as computers are vehicles for simulation and exploration and support activity based on curriculum. Osin (1998) in the study conducted on the usage of computers in education found that in the classroom computers have a positive impact because it makes teaching process to become easy to educators and learners as they will actively exploring phenomenon instead of being passive recipients of information as they share materials, experiences and support. In the study that was conducted by Bakia and Wright (2000) in the developing countries such as Barbados, Chile, Costa Rica, Egypt, Jamaica and Turkey they found that the computers in teaching has a positive impact because it provide educators with motivation and also on learners, better educational management, assists educators in mastering the requisite skills, enhance the teaching of subject matter of various curricular offer, promote cooperative in teaching and learning. They also find that it provide the higher level of thinking skills and communication skills. They also found that it improve the quality of education, integrate IT skills into the existing curriculum, rekindle educators interests in teaching, stimulate creativity, cognitive skills and collaborative work.

## **2.6 The researchers point of view on computer usage in teaching**

In teaching computers has a positive impact because it provide the students with an opportunity to study and reflect on the opportunities and limitations of using information and communication technology in a learning and teaching by examining their own use and understanding of ICT and further developing their skills in a reflective manner. My main aim of conducting this study is to look at the impact of computers in teaching where I look more deeply at the relationship between computing resources, pedagogical methods and teaching outcomes. In the study that was conducted by Yushau, Mji and Wessels (1992) about computer in teaching and learning of mathematics and science they

found that computer aid overall do a better job of converting learners intellectually power to mathematically achievement than do traditional method of teaching.

### **2.7 Computer technology in teaching Science subjects**

In the study that was conducted by Baillie and Percoco (1993) reveals that the use of information technology in scientific subjects makes many educators to believe that technical subject do appear to benefit greatly from ability to teach using computers simulations which help with student's motivation and understanding. They also said it allows educators and learners in practical experiments and help in data analysis and often work would be impossible without computers. In their surveys the results indicate that although there are many advantages in the use of computers in teaching and learning there are many difficulties in teaching using the new technologies because of logistical problems such as lack of time, technical support, appropriate software and hardware.

### **2.8 Educators attitudes on teaching using computers**

In the study that was conducted by Zhang and Espimoza (1998) where they were investigating the relationship among computer self-efficacy, teacher's attitudes towards computers and desirability of learning computing skills. They find that educators has positive attitude on teaching using computers because it gives the self-confidence, self-recognition of usefulness of computers and their perception of advanced levels of computers technologies were significant predictors in deciding their desirability of learning computing skills. In the study that was conducted by Blom and Smolenaars (1996) about the use of computers for teaching purposes they found that 40% of educators uses computers for educational purposes 30% are interested and 30% are indifferent. They find also that educators are mentioning that in pedagogy computers are used to clarify important relationships and process, improve the efficiency of learning and teaching and relieve learners of cumbersome tasks. They also find that computers are playing a significant role as it is mostly frequently used in practicals and in science subjects like mathematics and science. They also find that computers in teaching are

providing the extensive knowledge, extensive experience, extensive information and extensive assistance.

This study was looking at the impact of computer technology in teaching of NS and my study is supported by the ideas of Brunner (1969) where he is saying that the involvement of computers in teaching are the devices to aid the teacher in extending the learners range of experience and in helping them to understand the underlying structure of the material that the teacher is teaching about and in dramatizing the significance of what she or he is teaching. Brunner (1974) on the study where he was looking at the usage of computers in teaching foreign languages he found that the educators use PowerPoint in French and German classes and the language lessons are one that knowledge and skills are introduced and then built upon in future lessons. The researcher agrees with the study of Brunner but in this study I'm looking at the impact of using computers in teaching and I look at it in a point if they do have impact on teaching and how their teaching strategies and theories are affected by the use of computers.

In the study of Hawkrige (1990) and the survey that was conducted by Pelgrum and Plomp (1991) on the use of computers in teaching and learning, in their studies they have a similar idea that computers have a positive impact because it improves the instructional processes and the learning outcomes in teaching has a positive impact because it reduces emphasis in teaching and learning on memorizing facts in favor of emphasis on information handling and problem solving. But in their studies they also have not similar ideas because Pelgrum and Plomp (1991) also highlight that computers reduce the cost of education drastically as they will allow for reducing the number of educators yet the learners are more attracted to come to school through the use of computers.

In teaching computers has positive impact because it provides the work speed, work efficiency, work power and removal of human error from activities. It also has a positive impact because it supports easy study of students with their learning process. It has enhanced achievement and performance and motivation. In the survey that was conducted by Mckinnon, Nolan and Sinclair (2000) in New Zealand concerned with the use of

computers in teaching on 1,444 educators they found that 62% of educators are supporting the use of computers in teaching as they said it increase the performance of learners. They said performance of students nationwide school certificate examination showed that project students performed significantly better than peers in the parallel traditional school programme. This is not correct or I do not agree with Mckinnon, Nolan and Sinclair because they only conducted the survey in New Zealand so they are not suppose to say nationwide the usage of computers increase the learners performance more than the traditional classes this shows that they are overgeneralization.

Computer use has a positive impact in teaching because it represents the selected visual attributes of the objects and to show the observable interactions of objects. In this respect the computer screen corresponds to what students can visually observe in the laboratory and directly mimics some of the visual aspects of the laboratory experience. The computers simulation can be used to extend the range of the student's experience, performing more experiments or those that would be difficult for them to do. For example operation frog (Goldhammer and Isenberg, 1984) the student can gain experience in performing dissections and in measurements: length, mass and volume (Blake and Grenetz, 1984) the students can gain experience with obtaining basic measurements of objects on the computers screen. Computers in teaching attempt to provide imitations of what might be directly perceivable in the real world.

Computers has a positive impact in teaching because in the computer simulation of flotation one has the option of performing experiments (moving objects in and out of liquids) while viewing only observable visual attributes of the objects, liquids and events. In teaching computers has a positive impact because they change the ways in which we read, construct and interpret text. In doing so it forces us to rethink what it means to be human. Computers raise the issues and provide the educators with new and increasingly uncertain, perspectives on the existing theoretical problems on our pedagogical approaches and on the social systems that influence our construction. In teaching Singh and Sudarshan (1996) in their research on computers in education they find that it has a negative impact on teaching because in the classroom it entails malleability of kinds of

the technology as it is shape to educational goals and the classroom as educators and learners use and interpret the technology in different ways. Neither cognitive nor social impact can be considered independently of the functions the technology serves and of its meaning for those who use it.

Computers use in education has a positive impact because it will not bring a harsh in feeling the school system because educators will prevent that catastrophe. They will remain in schools and they will provide a uniquely human element as machines provide that vast stores of knowledge. They will ensure that education forms and develops the whole. The use of information system (computers) in teaching has a positive impact in teaching because it change the role of the educators because they will not relay academic information to students by lecturing, assigning readings, showing films or audiovisual displays or by using computers to assist their teaching. Computers in education are used with the aim of changing the role of educators because educators will no longer make the daily lesson plans and the routine preparations for classes, they won't have to devise and correct tests, the paper work will be eliminated. It will not be the educator's responsibility to cover a specific section of the curriculum over a given time. Computers give educators a greater freedom to provide that necessary direction. The greatest personal benefit for educators will be the success they achieve in educating their pupils. In using the computers in teaching it has an advantage and disadvantage because the success of educators is dependent upon the success of their learners where if their learners fail to learn using the computers they also suffer.

Computers has an impact on teaching because educators who have taught with computers agree that at least initially most users to computers make teaching more challenging, individualizing lessons, matching software to curriculum, scheduling students computer time, monitoring use, providing assistance and trouble shooting all add burdens to teacher time. Computers can assist educators in developing a creative learning situation that takes cognizance of individual learning differences also computers can empower and provide students all the tools necessary for promoting creativity. With the help of the computers the teacher can effectively address the challenge of organizing mathematics instruction in

such a way that it attracts and develops the abilities of the greatest number of students. In typical classroom computers provide easier and clear illustrations than those a teacher make computers help the educator to visualize mathematical and scientific concepts which are difficult to comprehend without computers. It has been shown that computers can stimulate projects that teach students teamwork problem solving and critical thinking as well as increasing their enthusiasm of learning and teaching.

In teaching and learning of mathematics and science computers are having positive impact because they are giving chances to educators to think and discover without threats of immediately evaluation especially during the practice and initial learning make educators to use creative ways of teaching (Paul & Kethy, 1990., Cangelosi, 1996., & Meissner, 2000). In teaching computers have a positive impact because it provides the educators with the creative expression, creative problem solving and provide the educators with the easy ways for solving problems of teaching. In the study that was conducted in Australia it shows that the educators are supporting the usage of computers in teaching where they said it adopting a student centered approach while other use the computers to enhance traditional approaches. Those adopting a traditional approach tended to largely use computers for words processing or retrieving information from CD-ROM or from Internet. In research that was conducted in Australia in 2000 it state that only 25% educators that are not using computers in teaching because they are lacking with computer skills that are necessary to use or to teach using them.

### **2.9 Computer usage in classrooms in Australia**

In the survey that was conducted in the secondary schools and primary schools in Australia it gives that computers has a positive impact in teaching because the educators in these schools are stating that computers are generally had a priority for teaching use as it tend to broaden sources of information and improve the teaching presentations and also developing the teaching capabilities. In this survey three schools appeared to use computers mainly to enhance traditional approaches to teaching and learning although some teacher were also inclined to use computers to implement a students-centered

approach. In one school where the survey was done they found that the whole integration of information technology is more widely into other curriculum areas as a result the computers are used mostly across all key learning areas.

In the survey that was conducted in Australia it show that the usage of computers in teaching is supported by most school where in most school the principals and most educators they indicated that computers are playing a major role in implementing a student-centered approach. In the primary school where also the survey was done they found that primary schools are tended to exhibit a more student-centered approach than secondary school where the four primary schools state that they use multi-media software in teaching and other primary schools state that they use most computers for activities occurred outside the usual classroom in laboratories and model classrooms. In one school they were not having the laboratories but they were having the computers in their classrooms and they were having a clear strategy of using multi-media packages as tool for student centered approach for teaching and learning and the classroom was set-up to encourage the group work with computers.

### **2.10 Computer technology in primary schools in Eastern Cape**

In the study that was conducted by Mngqibisa (2001) on the impact of using laptop computer for teaching and learning in Dongwe Combined Primary school at Eastern Cape in South Africa he found that it has a positive impact in teaching because it makes teaching and learning to be more effective and take away a teaching strategies of traditional method where the teacher was suppose to be the one that is coughing the information and learners must absorb. He also find that computers are playing a significant role because it create the interaction between the learners and the educators where the learning is learner centered and where teaching, is a teacher facilitator. Computers have a positive impact in teaching because Mngqibisa (2001) said that “Computers makes the educators always to plan activities in such a way that learners work cooperatively as this is one of the principles of Outcomes Based Education”. In his study they found that by using the computers in teaching it resulting educators to have an

access to wide variety of relevant information and use it in the class and this means that any other teacher can have access on the information. He make the example of the theme 'ENDANGERED ANIMALS' where they able to integrate with other learning areas like science and literacy where he state that computers has a positive impact in teaching because you can able to take something in other learning area and teach it in other learning area.

Mgqibisa (2001) also state that computers in education are playing the good role because the software that they use that is PowerPoint in presentation of their lessons it makes learners to improve what was previously difficult to present work for them. In his study he also found that computers in teaching and learning makes the learners to improve and develop, critical thinking skills, help them to master reading, spelling skills and writing.

In the study that was conducted by Klass (2002) in Butterworth High School in Eastern in South Africa and her study was looking on the impact of using computers for teaching and learning where she found that computers have a positive impact as it change the educators from traditional approach to more advanced technological approach of teaching and learning. She also found that computers in teaching also have a negative impact because she found that in this school some other educators are not well trained so they have a fear of teaching using computers as they fail to use it so she get that this is a challenge for those educators to organize their classrooms and to plan their daily activities. She also found that computers have a positive impact in teaching because it makes the teaching and learning process to become more conducive and it create the curiosity to educators and learners to utilize it because they are so keen to explore and discoveries.

Klass (2002) said that "Computers in teaching has a positive impact because it makes the teacher and the learners to work towards the same goal and to the goal of getting information and explore what is happening across the globe. She also found that computers have an impact in teaching using them because it makes the learners to become actively involved in searching for information for their projects and assignments

instead of going to the libraries and the educators and the learners are discussing the findings. She also find that computers in teaching has positive impact because educators now do their teaching planning using computers, do timetable for their classes, recording the evaluation sheets as well as designing worksheets for their classes. She found that in this school computers are using to teach the following learning area LLC, Mathematics, Science, Life Orientation as well as Technology so the educators are encouraged to discover for themselves and not shift away the responsibility of them.

In the study that was conducted by Connell (1998) on the impact of computers in teaching mathematics and science he found that it has positive impact because it influence the educators and learners to construct their construct their mathematical and science meaning by creating computer based tools for using in solving the mathematics and science problem and present their work actively in classroom. Computers in teaching and learning have a positive impact because it provide education to go beyond teaching basic literacy and numeracy skills, cognitive skills, strengthen process of inquiry, enable collaborative problem solving and prepare educators to compete in the global markets. Mary (1999, pp: 2) said “Computers in teaching has a positive impact because it supporting student-focused education, which encourages and enables learners discovery and knowledge creation rather than conventional teacher-centered delivery of facts.

### **2.11 Involvement of computer technology in the curriculum**

In teaching using computers it has a positive impact because since it is integrated into the education curriculum it improve the teaching by strengthen the teacher professional development and support broad educational reform, enhance school community partnership and improve school management. Computers in teaching helps in schools and help professional decide if such project helps achieve strategic educational objectives and address critical learning needs. In teaching computers has a positive impact because it is involved in the educational arena and changed how teaching is delivered and learning is processed by enhancing teacher training and improve access and equity. In schools computers and multimedia technologies offer potential teaching and learning

opportunities and solutions that were not readily available before. Computers in teaching and learning make the learners to be centered in education and the teacher must take the new roles as facilitators who empower students to questions, experiments, collaborations, inquire, and construct knowledge and understanding. In teaching computers offer the higher cognitive skills as it makes the new curriculum, teaching practices and pedagogies that are needed to enable students to develop and refine critical thinking skills.

Computers in teaching enabling the reflective teaching and learning and creative expression where educators need to create learning environments that enable students to acquire and use information that helps them to understand their world and experiences and eventually generate new information and knowledge. In teaching computers play a significant role because it makes teaching and learning to takes place before, during and after formal education, beyond the classroom and through a variety of means. IN teaching and learning computers has a positive impact because it accelerate teaching and learning of the different subjects, bring education to those without them, improve the teaching conditions, enhance schools and classrooms management, encourage needed changes in pedagogy and enrich and individualize learning.

Computer usage in teaching and learning has a positive impact because it makes educators and learners to be ill-equipped to participate in modern economies with solid technical and research skills. In the *Apple Classroom of Tomorrow (ACOT, 1996)* in the research that was conducted he found that computers have positive impact in teaching because it changes and improve the behavior and attendance of educators and learners along with attitude toward themselves and toward learning as well improving the performance. In the test score that are done in the ACOT research (1996) they found that computer has playing a significant role in teaching because it makes the learners to perform well and some were clearly performing better than before, students wrote more, more effectively and with greater fluidity. In teaching computers has a positive impact because in the ACOT research they found that instead of isolating students it give them the access to technology actually in encouraging them to collaborate more than in traditional classroom more than in the traditional classroom.

Students found computers uses even more interesting as time went on. In this ACOT research in 1996 they also found that computers in teaching have positive impact because it makes the educators and learners to explore and represent information dynamically and in different forms. It becomes more socially aware and confident, able to communicate effectively about complex processes. It provides self motivated and independent learners gain the ability to work collaboratively and developed a positive orientation toward the future. It has a positive impact because it makes the educators to mastered content quickly and shared their understanding spontaneously. In the study that was conducted by the staff of Educational Testing Service (ETS) on the effect of computer use on performance in mathematics and science support found that the use of computers in teaching has positive impact because it give the teacher higher order of thinking skills that are positively related to both academic achievement in mathematics and science and the social environment of the school. In the researches that are done in Grenada (Bosch, 1994), Chile (Hepp, 1998), Jamaica, Costa Rica (Wolff, 1998) and LearnLink projects in Brazil, Namibia, Morocco and Guatemala (AED/LearnLink 2002) they found that computers in teaching has positive impact because it improve the learning outcomes, greater teacher satisfaction, enhance professional development and improve the school community collaboration. Computers in education provide the new teaching approaches that introduce along with computer technologies the effect on improving learning and the continued practice of better pedagogy is often greater.

### **2.12 Computer technology in teaching mathematics and science**

Computers have a positive impact in teaching of mathematics and science because it creates a stronger learning partnership between the educators and with their students if the use of computers is integrated effectively into learning systems. It is used to achieve diverse educational ends similar to the way that textbooks, laboratory equipment, curricula, or other educational technologies can be used to enhance education. Computers in teaching can use to give helpful to create a few models of good use to guide decision making and stimulate creative applications. Computers in teaching and learning reformed

them especially in teaching and learning in the classroom can occur when educators have opportunities to change the way they work with students and engage the learning process. Educators learn to use the computers as they learn to create interactive and collaborative learning environments that foster interdisciplinary and active teaching and learning. Computers also have the negative impact on teaching because it does not identify the specific indicators of achievement that can be used to assess the progress and to achieve the educational goals.

The use of computers in teaching offers many benefits to enhance education. Most important the integration of computers to the curriculum has a potential to increase students motivation (Anderson, 2000). Computers has a positive impact in teaching because it changes the nature of tasks, increase educators self efficacy and improve educators self-worth. According to the ideas of Clowes (2000) about the usage of information technology (computers) in teaching he found that it has a negative impact in the classroom because it don't give the understanding, it cannot demonstrate what it means to do science and it wont inspire the curiosity necessary to becoming a scientist. Clowes (2000) also saying computers in teaching have a negative impact because it they are hazardous to educators and learners health, causing problems such as eye strain and obesity.

In the study that was conducted by Grenier and Thornbury (2001) they found that computers have a positive impact in teaching because its feature programs are providing the feedback and reinforcement. In the observation that was done by Grenier (2001) on the usage of computers in teaching he found that computers are changing the teacher's attitude and behavior because the teacher's attentiveness and cognitive advances are playing a significant role promoting the learning activities. In the Sunday Times recently (Leake and Robbins, 2001) were reported that computers in education are restricting the development of creativity to the young educators more especially educators of mathematics and science. In the Docklands Projects in East London they found that computers in schools are having the positive impact in teaching and learning because

they are redressing some of the disadvantages in teaching and learning and they are also improving the standard of achievement of the teaching and learning outcomes.

### **2.13 Observations in teaching Mathematics and Science**

In the observation that was done by Connell (1998) on the usage of computers in teaching mathematics and science he found that computers have positive impact because they giving the educators to explore and to do the presentations using it. It makes the educators to construct the mathematical and science pedagogy in classroom by linking with instructional approaches. In teaching and learning Enderson (1997) said “Computers in teaching play a significant role as it provides the educators to presents the activities to help the learners to explore and to understand the mathematics and science curriculum by using the appropriate education software. It allows the educators and learners to engage in groups to imagine, explore possible solutions and make better sense of mathematics and science. In the study of Schumacker (1995) on the effect of computers based on mathematics and science lessons he found that computers help the educators to create the positive teaching and learning environment for mathematics and science instruction and as result this change the role of educators and learners.

In the research that was conducted by Du Plessis, Biljon, Tolmie and Wollinger (1995) on computers in education where they found that computers in education have a positive impact because it create the cooperative teaching and learning, constructing problem solving by using the expert techniques. They also found that it improve the thinking skills to the educators while teaching content. In teaching computers has a positive impact because it gives the impressive outcomes and that are at the level of engagement. To educators computers use have a positive impact because it makes them to work easily. In the study that was conducted by Connell (1998) on the use of computers in education he just quoted the one of the educators:

***“In teaching computers are playing the significant roles because they are making our work to be easier since it make our work to be more quickly and efficiently”***

Computers in teaching have a positive impact because it gives the educators to do the really cool presentation that are becoming effective to the learners. The use of computers in teaching play a significant role in teaching because the nature of the task shift from teacher centered to the learner centered. It makes the educators to have the diversity of the tasks, the activity become designed upon the learners prior knowledge and also address the learners and educators interests. The usage of computers in teaching have a positive impact because the research that was conducted by (Brophy, 1983, Meece, 1991, Miller & Meece 1999) shows that computers have a positive impact in teaching because it makes the educators to teach using the challenging tasks and engaging the academic tasks which are build upon the educators prior knowledge and as result it make them to construct their own understanding of the content and enhance the learners motivation and increase their self confidence in their cognitive abilities.

Computers in teaching are playing the significant role because it possesses the skills that are necessary to successful accomplish the tasks like the assignment as well increasing the motivation to educators (Ames, 1990). In the data that was collected by Rochowicz (1996) on the usage of computers in teaching and learning he found that educators are developing the positive attitude towards teaching using computers where they said it make teaching and learning to be more relevant, meaningful, enjoyable, consequently and make teaching and learning frustration to declines. The research that was conducted by Heafner & McCoy (2001) on the impact of computers in education they found that computers in teaching have a positive impact because it enhance the quality of work, promote access to resources, positively impact educators progress, promote educators meta-cognitive skills. Computers in teaching and learning make the learners to have a positive attitude because it makes them to feel more self-confident in completing the assignment due to their familiarity with computers.

The usage of computers in teaching have a positive impact because it increase the educators belief in the ability to accomplish the task, consequently making the educators to willing to take risks and approach challenging tasks. In using computers in teaching make the changes to the learning environment to focus on the mastery learning while

promoting cooperative learning and make the classes to become less structured and diminishes traditional views of competition as a means to motivate. In education computers are increasing the communication to educators and collaboration for the positive outcomes of the technology integration where the educators are sharing their knowledge and skills with their peers in the noncompetitive computer lab environment.

Galligan (1995) state that computers into the teaching and learning has a negative impact because it does not improve the teaching and learning outcomes because to teach using the computers make the role of the teacher to be critical to the effective use of computers for learning. Laurillard (1994) state that the computers in teaching has a negative impact because the use of computers and the diversity of the classroom environments combine to make the teaching and learning process to be complex. This is caused by that the use of computers for teaching and learning provide the framework for describing and evaluating classroom practice and for interpreting.

#### **2.14 Criticism of computer technology in teaching and learning**

Dwyer (1994) criticize the use of computers in teaching by saying it has in effect on classroom practice because the observation profound changes in the nature of instruction, learning, assessment and the school culture itself. Ellington, Percival & Race (1993) in the study they conducted where they were looking that how are the teaching and learning outcomes are achieved by using computers and the results of their study were that computers have a negative impact in teaching and learning because it shift away the teacher dominant in the class and truehearted provision and it support the learners centeredness'. They also find that it increase the use of individualized learning materials rather than traditional face to face teaching and learning situations. The findings of their study are showing the negative impact of computers in teaching where it shows that computers in education are increasing the realization that there is much more education and training than the teaching of facts and principles in other words that the process of learning are even more important than the process of syllabuses.

They also find the negative impact of teaching using computers that the other educators said they don't have enough time to develop applications, lack of knowledge on the use of computers so it become difficult to achieve the learning outcomes. Not enough findings, difficult to fit in present teaching strategies, difficult to obtain information on hardware, difficult to obtain information on possibilities of use of computers in teaching and learning. In the study of Pelgrum and Plomp (1991) they found that educators are indicating that computers has a negative impact because they indicate lack of time to improve teaching strategies by use of computers. Educators in this study are saying the use of computers have a negative impact on teaching because they said the implementation of computer use in teaching must be connected with a relatively low priority that are give by the educational organization and they said a change inn priority by educators in the department level is necessary to promote computer use in teaching.

In the study that was conducted by Leiblum (1989) found that the use of computers in teaching has a negative impact because mostly educators are working in isolation, absence of coordination and general absence of expertise and knowledge regard use of computers in teaching and learning. Leiblum said this because the background of the educators regarding the use of computers in teaching and learning gathers and disseminates information and experience in this area. In Hawkrige (1990) in his study on computers use in teaching he found that teaching and learning educators are favoring the usage of computers if there can be specific responsibility between the educators and educational organization with regard to the implementation of computer use where both educators and educational organization they will set the goals of teaching using computers,, create necessary conditions, evaluate teaching and learning outcomes and stimulate specific innovations. He also found that educators have a willing to use computers if they can be initiative and there must be change in the new ideas into educational practice.

### **2.15 Computer technology in the new curriculum**

In the study of Jones & Mercer (1993) on the impact of computers in curriculum they found that the use of computers in teaching give the great pressure to educators to include it in their lessons either the learners to fulfill the learning tasks set by the teacher. They continue saying that the computers are mostly used in the Religious studies, Modern foreign language and in Science and Mathematics but the problem they found is that the majority of educators lose their personal interest in using computers because they have lack with experience and they found that it does not improving the learners understanding. In the study that was conducted by Heermann (1988) on the impact of computers for teaching purposes he found that it has a negative impact because in his study he found that about 71% of educators are not using computers in their lessons yet they are there and he said this is caused by the lack of knowledge and experience on educators on the uses of computers in education. He said this lack of experience is mostly cause by the small time that educators are giving in doing the training.

### **2.16 Challenges of computer technology in teaching**

Computers into classroom can present important challenges to the curriculum, challenges that are difficult to resolve. Shavelson and his colleagues (1998) in their study of how successful computers work in education, they found that the most comprehensive approach educators adopted was to use several types of software as an integral part of the curriculum. Educators expressing discomfort with the ambiguous status. They were dissatisfied with the computer work in their teaching and learning. They were convinced that the hope for learning of learning of general problem solving skills had not occurred. The teacher observations were supported by research results when performance of learners in traditional classroom were compared with the students who had on computer classroom the results demonstrated that no effect of using other teaching materials on the problem solving skills planning. At the end of the second year educators again were dissatisfied with what most students had accomplished. Our assessments demonstrated

that many children had made relatively little conceptual progress. Educators said computers is recognized as learning tool but also that they needed to devote significant time to incorporating them into the classroom work.

### **2.17 Educators attitude of teaching using the computers**

In the research that was done in Florida on the usage of computers in teaching the findings were that the educators are having a negative attitude on the usage of computers in teaching where one teacher said that she was thinking that she is the best teacher in teaching Mathematics and Science but through the use of computers she become frustrated because the results that she was always getting by using the traditional methods were very good but by using computers in teaching the results become bad and the progress of the learners is so poor. In teaching and learning computers has a positive impact because it provide the huge quantity of information now available for students to absorb but the educators will continually encourage them to integrate this learning into their lives and will show them how to do it. It has a positive impact on teaching because it provide the information to educators and learners without being subject to the training, skills, and personality of individuals educators can education truly change. It can relieve educators of time consuming myriad of their presents tasks can these human mentors reach their maximum productivity.

In the study that was conducted by Cosford (2000) on computers in teaching and learning he found that it provide the educators and learners with an opportunity to study and reflect on the opportunities and limitations of using ICT in teaching and learning situations by examining their own use and understanding of ICT and further developing their skills in a reflective manner. In Hungary in the study that was conducted they found that computers has negative impact because most educators are not well trained and they are lacking with knowledge and experience of using computers in teaching and also they state that most of the educators are computer illiterate and other educators are the unqualified educators so it becomes difficult for them to teach using computers.

Computers have a negative impact in teaching because in Hungary they also state that it can be dangerous to the eyesight of students because of the need to read from the screen. In teaching information technology (computers) has an impact because it shift the task of educating learners from parents, educators or rather from home to school, it force the adoption of the written word as tool of education and shift ways the invention and widespread of printing materials such as books. In teaching and learning mathematics and science computers has a positive impact because it enrichment and improvement of conditions in which human beings learn and teach. The impact of computers in teaching mathematics and science is positive impact because it encourage curiosity exploration, experimentation, fantasy, questioning, testing and development of creative talents so the educators develop important abilities since they will learn to explore and visualize a problem to invent own or to modify given technology to listen and argue to define goals to cooperate in terms.

In the study that was conducted by Schank (2001) on the impact of computers in education where his study was the unresolved study because he said “Computers in teaching and learning will have an impact immediately the educational models of teaching and learning have changed”. It was unresolved study because he continue saying that in teaching computers has been used to do the same things as done before but faster than they were done manually before and the model remain the same as the model that was used before for example today educators use the classroom that have the computers that are full of PowerPoint slides with graphics and written equations but in the end educators teach as before. Schank (2001) said “In teaching computers have impact but it is not clear that is a negative or positive impact because the real challenge is in changing the learning model since computers have a potential to switch from being a way to do the same things faster to being a way to do things in a way that is impossible in the real world”.

## **2.18 Negative impact of computers in teaching**

The computers have an impact in teaching because by teaching science using the scientist terminology doesn't mean and allow you to understand their ideas and theories, Learning language by speaking doesn't allow you to understand the grammar, playing a market game doesn't allow you to learn economics, in all Schank (2001) said "Computer usage in education is still new so let us not able to judge that they have positive effect and negative effect". Through my own point of view Schank (2001) has a negative attitude about the usage of computers in teaching because he said "Educators teach mathematics and science using computers without an explaining abstract foundations and he said it impossible to teach the learners without understanding how the computers works". Through this Schank (2001) said this because he was commenting that most educators are computer illiterate and some others are limited information about how to use computers in teaching and learning. Schank (2001) at the end of his research I found that he has a negative attitude about using the computers in teaching because he said "Those who understand that computers allow you to do things differently and that replicating old methods with new technology methods doesn't make sense".

The computer usage in teaching and learning has a negative impact because (Pearson and Cochrane, 1995) said "Computers in teaching are disconcertingly unproductive in the teaching and learning outcomes and in their study they found that the educators who try to use the computers teaching said it is not effective in teaching because they said they spent the lot of time in learning how to use the computers in teaching and at the end they found that it is producing nothing that is original or innovative". Computers in teaching and learning are having a negative impact because it decreases the hierarchical level between the educators and learners to become more co-operative (Reil, 1993). In teaching and learning computers can have an impact if they can help with donkey work preparation and backup and on that they will preserve the quality and it is possible that they will contribute to concealing a decline in quality. Computers in teaching are glamorous, dramatic and symbolize where our culture is heading and this means that their

introduction into education is often taken rather uncritically as being a sign of progress. Computers are having a negative impact in teaching because they are cheap and the teacher's life is expensive that means the times of declining provision for education, replacing educators with computers is, in effect merely downsizing in the academy (Landow, 1992).

Baudrillard (1998, p: 103) said "Computers in teaching has a negative impact in teaching because in effect they are the replacement of educators by machines for examples in artificial intelligence shows that the things that educators do which it was thought could be "done by machines" are now seen to be merely imitated and the problem is that the cultural theorists are pointing out that the imitation can come to be accepted as the reality. The use of computers in teaching and learning has no impact in teaching because computers have been no revolutionary changes in the way schooleducators teach and their introduction in teaching have fallen in short and the effort has largely been a waste of time and money. In the study that was conducted by Shapiro (2001) in the usage of computers in the classrooms favor the "constructivist, learner-centered" pedagogy as opposed to "teacher centered" direct instruction and he claims that there is little evidence that the use of computers in the classroom has done much to change prevailing pedagogies. In other words if the teacher used predominantly direct instruction methods before the introduction of computers he or she simply would use the computers to supplement that teaching style.

***Shapiro (2001) cited Cuban where he argues that there is a little evidence that computers have much effect on learners performance on standardize test and to the teaching and learning outcomes.***

Shapiro (2001) in the research that he was conducting noticed that computers in teaching and learning is about to revolutionize the process of teaching and learning through the fact that teaching and learning are intensively personal activities and at best technology helps to facilitate the interaction between teacher and the learners. Cuban study is showing the he has negative impact about the usage of computers in teaching by saying the transformation that computers bring in teaching is only focused on what happening in

the classroom and not focused on what happening in the classroom. Cuban study also showing the negative impact of computers in teaching and learning where he said that “Computers in classroom are just the tools but the task for the educators remains the same to help the students to convert this information into knowledge and understanding.

The impact of computers in teaching and learning has been impressive because most physics educators and other educators in their learning areas have not change their basic teaching methods. Computers in teaching and learning has a positive impact because they are readily available much of drudgery of data acquisition and analysis in teaching laboratories is being done by the machine and this leaves more time for both students and educators to explore the meanings of the results. Computers in teaching and learning are playing the significant role to educators and students because they has been a constructive development, since they has played a significant role in hastening students academic achievement and social interaction. In teaching and learning computers has a positive impact or effect because they make teaching and learning to be more attractive, easier and more educational. Computers are also playing a significant role in teaching because they empower the students to the point where many classrooms have now lost their hierarchical structure and witness more cooperative efforts towards learning.

Robertson (1999) in his study on the impact of computers in education found that there was a poor implementation of computers in schools and this cause the lack of readiness to prepare educators and students for education achievement. He continue criticizing the implementation of computers in teaching and learning process that the implementation of computers are having an impact because of demonstrating the misguided notion of technology implementation as a public relations show and tell that it diminishes the influence of the appropriate use of computers in schools. Robertson (1999) in his study is criticizing the way computers are implemented in education where he is saying computers are having a negative impact because in the implementation the funding decisions for computers purchases for schools and the role of business interests and marketing strategies in the education market that they are the one that make the computers in teaching to be dysfunctional.

The study of Robertson (1999) on impact of computers in education is attacking ACOT research (1996) where they were looking the attitude of educators about the involvement of computers in teaching where Roberson attempt to deconstruct the findings of ACOT research by saying their findings were not covered the market driven agenda of Apple and other corporate stakeholders in education. Robertson believe that the presence of the ACOT research in some schools sites did not influence student learning and students achievement at those sites involved with the ACOT program. Robertson also attack the study of Dwyer (1997) on usage of computers in teaching and learning where she said Dywer cited the ten sources where Dywer was the principal of the two sources and the six sources were unpublished, one was the Memphis newsletter and the one was the U.S. labour force data. Robertson cites Neil Postman who stated as follows

**‘I am not arguing against using computers in schools. I am not arguing against our sleepwalking attitudes towards the use of computers, against allowing it to distract us from important things, against making a god of it’**

Robertson uses Postman position to raise consciousness on the unquestioning acceptance of using computers in schools, and the education system without an understanding of its appropriate role and function in schools that are implementing computers.

Robertson (1999) through her research findings she started to attack the research findings that were founded by the other researchers that they found that computers has a positive impact in teaching, Robertson argues that computers become a classroom focus when the computer tools they shape the teaching task, the tool itself becomes a goal, she continue saying that the tool of technology rewrites the task of education in both philosophical and concrete ways by redefining what knowledge is of value. The role of computers and their enabling applications in the schools for teaching and learning are seen as reshaping and altering the teaching and learning process in schools. Robertson argues that ‘since information technology (computer) is the tool that seeks, finds, stores, organizes communicates, and packages information, it is hardly surprising that information tasks jump the queue in technology-centered classrooms.

Robertson (1999) in her study found that computers in education have a negative psychological and social impact in teaching and learning because its settings and the opportunity costs inherent in its implementation. She argues that computers in education are the tools to shape the task and since the computer is much better at adding to the information landfill than dealing with emotional, social and other intellectual needs of educators and learners. She continue saying that computers in teaching and learning are redirecting the schools to teach learners how to acquire the information faster and their major problem is that computers are leaving the other goals behind. Computers in teaching are changing the roles and behavior and soon the educators were giving technology credit for every positive event in ACOT classroom.

In the research of Robertson (1999) it show that she has a negative attitude on the usage of computers in teaching because she said “Computer in teaching may control not just what educators think about but how they think and this new way of teaching implies that computers are fun and making the processes of teaching not entertaining. She also has a negative attitude because she is saying computers in teaching can mould the minds of the educators to view education as ‘edutainment’.

In the study that was conducted by Jones (1995) and Illich (1990) on the impact of computers in teaching and learning where these were unresolved study because they were having a question that they consider that does corporate involvement in implementing the use of computers in teaching amplify or diminish the appropriate use of computers in schools? So through this question that they come across they fail to answer and resulting that their studies to become the unresolved studies. In the study that was conducted Mkhize (2003) and with the study of Jones and Illich (1990) on computers use in classrooms also their studies were the unresolved studies because they fail to answer the question that how can computers in schools serve the emotional, social and psychological needs of the whole students? This question result their studies to be the unresolved studies. In the study that was conducted by Jones and Illich (1990) it was the unresolved study because where they were presenting their study there was a question that arise that

how can the adoption of technology implementation plans in school remedy the dysfunctional nature of computer in schools? This also was another unresolved study since these two authors fails to answer this question. So in my study this will contribute because it's where I will able to go beyond and look over the problems that make their studies to be unresolved. Since their studies were the unresolved studies so to my study it makes me to look into different dimensions so that this study will never be the unresolved study.

In the study that was conducted by DeCorte (1987) in USA about the impact of computers in education he found that there are lots of complains concerned the way computers work in education where he found that computers are not improving education and the computer experience are inferior to the real ones. The other researchers in USA are also commenting about the involvement of computers in education because they said in the education system computers have disappointed many people who had hoped their presence would engender reforms leading to education both more congenial to children and more effective than the norm of the past generations. DeCorte (1987) cited Verschaffel when he was saying that:

*'The immediate connection between the book and the current inquiries about using computers with children. Some have claimed that computer experience in teaching and learning would influence in a positive way the teaching and learning and thinking capacities of children. In contradiction to the image produced by the rest of the available research literature, Lawlers study produces positive results concerning the cognitive-effects hypotheses'*

### **2.19 Negative comments of teaching NS using computers**

About the usage of computers in teaching and learning there are some negative comments and reports that computers in education are producing the negative outcomes when the results of thoughtful experiments which are executed with care have the proper function of constraining the enthusiastic claims of the overly optimistic. On the other hand

DeCorte (1987) stated that the usage of computers in teaching has a negative impact because of the different outcomes of the different levels where there is too much evaluative models where some Input should produce some Output; some instruction should produce some Outcome. The other researchers in USA have an idea that the human behavior becomes evident only when one looks very carefully at extremely tiny details, most experimental efforts to assess computing impact will show negative results up unless they examine the process between input and output the teacher between the instruction and the outcome. DeCorte (1987) is showing that computers in education has a negative impact because he is saying computers are providing the knowledge and functioning but it does not give a depth understanding of the educators mind and development normally beyond the reach of research with broader focus.

DeCorte (1987) in the study that he was conducted on computer use in education his study is showing that he has a negative attitude about the usage of computers in education because his study is attacking the studies of the other researchers that they said computers has a positive impact in education when he said we need to go beyond evaluative studies of broad claims in order to advance our understanding of human cognition, especially in respect of the issues of the malleability of the natural mind and of the long-term effects of specific experiences on the lives of individuals and the central issues for the negative impact of computers in education. DeCorte is showing that he has a negative attitude about the usage of computers in education because he also saying that computers in teaching and learning are not bringing the strong outcomes and also no strong outcomes has been occurred since computers were involved in education.

DeCorte is showing a negative attitude on the usage of computers in teaching when he said that “Computers are introduced in schools but they have not had a beneficial and their early proponent that was suggested is not fulfilled”.

Computers in education has a negative impact because in the research that are done before they found that there are problems that are not solvable by using computers where they said that it is just to improving the mathematical and science competence through

using computers and on that there is a general impression that is based on the test results that arithmetic skills have been deteriorating over the past 25 years. DeCorte ((1987) is show that he has got a negative attitude towards the studies that they found that computers have a positive impact in teaching and learning where he said “It’s time to face the facts: all previous efforts that on inclusion of computers at educational reform have been failures. The harder we try the more innovations we make the dumber the educators and learners progress and also affect the education outcomes. This is eloquently pointed out by proponents of the ‘Back to Basic’ movement in numerous riots and book burning across the country”.

The usage of computers in education has a negative impact because through the usage of it is simply not possible to educate children and if repeated attempts to improve the quality of education only to make matter worse the obvious way to make matters better is try to degrade the quality of education. DeCorte (1987) said “In fact, if we need usage of computers in teaching to be successful we need to proves that the best educational reform would be to abolish effort at education system altogether”. As DeCorte said this he was challenge by Holt and Illich (1988) where they said “If we abolish the effort in education it will abolish the major value of the schools system which is to supply employment and position of power”. DeCorte (1887) stating that the computers in education has a negative impact because by placing computers in the schools we can let the educators teach the computers and send the learners home, he continue saying that we envision an educational system in which each child is assigned at a computer which goes to school in place of a child.

In the study that was conducted by Lawler (1985) on the usage of computers in education found that by inclusion of computers in teaching and learning process are changing in the everyday world and completely overwhelm the hopes of the educators to teach the learners skills that they know that they will need later. Lawler (1985) in his study he suggested that the specific government policy for inclusion computers in education has a side effect and has been making the education around the world less sensible and harder to teach and learn about. He continue saying that computers in teaching are making the

teaching and learning process to become less comprehensible because the effects are not uniform since it change obviate the need for much mental calculation. As computer are used in education there was a question that were raise that the introduction of computers in teaching and learning process that does computers in education is for financial success of the some companies yet the record with respect and advancement of educational goals are the one of nearly the consistent failure.

The disappointing impact of computers on education may be partly explained by the lack of content addressable with the technology. The inclusion of computers in education has a negative impact because from the earliest days of the invention of the computer, there has been a promise that they would play a major role in education, from helping children to learn in the school and in home to helping the adults to acquire job training but up to day that potential has not been realized. Skinner (1958) said “By and large the impact of computers in education has been minimal because recently the dominant theory of education focused on learning as knowledge transmission, technology was thus used as the method to deliver information for example computer assisted instruction packages employed for the most part a drill and practice methodology of instruction. In the study that was conducted by Kulik & Kulik (1976) on the educations and computers they found that teaching using computers has negative impact because it reduce the teaching and learning time by up to 30% and reduce the test scores by up to 10% when compared with the human taught courses it has been felt that such decrease have only just begun to tap down into the potential of computers in education.

In the study that was conducted by Dewey (1916) on learning through doing he argue that one learns through direct experience by being engaged in authentic tasks the learning is not then a process of transmitting information from someone who knows to someone who doesn't rather learning is an active process on the other part of the learner where knowledge and understanding is constructed by the learner. Computers in education is use in sense of making mathematics and science in the 21<sup>st</sup> century to consider these new technologies because will be the ways to improve the curriculum of the future educators of science and mathematics. Computers in teaching and learning has a positive impact

because it help the educators to develop a critical view of how technology can be incorporated and used in the context of the classroom to help in the of mathematical and scientific concepts. Computes in teaching and learning offer the data and pedagogical-cognitive elements to the design of interactive environments based on the simulation computational environments, problem solving and to the appropriate for the development of mathematical and scientific concepts.

The use of computers by the educators in teaching has got the positive impact because it contributes to a possible new dimension to the process of teacher's education and to the process of exploration and construction of scientific and mathematical concepts. In the LAPEMMEC research they found that computers in teaching encourage the educators to develop the several activities that are including the content for educational sites which deal in a certain depth with the given theme in mathematics and science. The computers in education are having a positive impact to educators because it makes them to exchange the information and ideas on the creation of the knowledge and then able to express their doubts about the content of their knowledge. The usage of computers has a positive impact because it makes the educators to become charge of discipline and should take the role of facilitator allowing the learners to construct the knowledge through the construct use of the computers. The educators together with their students needed to contribute as much as possible to the improvement of the teaching and learning process by changing and generating the new contents and ideas.

## **2.20 CONCLUSION**

The researcher was looking at the impact of computers in teaching NS the researcher find that there lot different ideas about computer usage to teach NS. This chapter clearly outlined the different views of the different authors as well with the ideas of the researcher about computer usage in teaching. The literature review in this chapter is used to structure the theoretical framework which will follow in chapter four.

## **CHAPTER 3**

### **THEORETICAL FRAMEWORK**

#### **3.1 INTRODUCTION**

According to Branch (1995), a theory is an idea or set of ideas based on facts and observations in order to explain phenomenon or opinions and suppositions about phenomenon which has yet to be disproved. A theory or theories that are relevant to a particular area of research are used to conceptualize a broad theoretical framework for that research. This chapter draws on the literature review and attempts to locate this research in a particular framework.

This study was shaped by critical theory because its focus is on the process through which the identities are developed. Through this point the identities of the NS educators will be developed since the usage of computers in teaching is still new and it will develop their confidence of their teaching strategies as they will be able to communicate with other teachers in different schools via the e-mail. Also through this point it will shape or fit in this study because the researcher was looking at the impact of computers in teaching it is when the educator's identities will be seen and is where it will be developed. According to Freire (1998) critical theory in teaching is aiming to that the progressive educator through a serious, correct political analysis is to unveil opportunities for hope of no matter what the absence may be. The critical theory has the major objective of focusing on the specific ways that the cultural institutions ranging from media to scientific and academic work that are used to shape the identities, dictating what is accepted as true, normal, or accepted within the culture. So by using this theory the NS educators may benefit in their teaching as they may move from traditional method of teaching to technological methods of teaching and this will shape the academic work to become more systematic.

The aim of using this theory in this study was that the researcher was aiming to inquire into what prevents the realisation of this enlightenment ideal. The researcher used this theory because the researcher was aiming to question and challenge the teaching of NS using the computers and to get the simplicity of the world about teaching using computers (McCarthy and Hoy, 1994). The researcher used this theory, because it is concerned with the discovering or uncovering the views, ideas as well with their feelings of the NS educators teaching this subject using the computers. The critical theory involves questioning and challenging the passive acceptance of the way things are, the way things seem to be. Through this point of departure researcher was aiming to question the NS educators about how do they accept the usage of computers in teaching NS. The critical theory questions and challenges the conviction what is the process of becoming or what appears to be, or what is most commonly understood to be (Torres, 1998).

The researcher used the critical theory because the main aim was to get how the NS educators work using computers in teaching to think, read, write and act critically and to develop the ability to recognise, understand, explain, account for, justify the kinds of judgements, the way in which we make judgements and the standards and criteria we use in making judgements throughout the everyday life. The researcher used this theory because it allows and empowering the agents to be able to question, challenge and contribute towards the progressive transformation within the communities, societies and cultures that help to maintain and reproduce everyday (Torres, 1998). Through this point it works through this study because the NS educators will be able to become empowered in their teaching by using computers as it is a new transformation so they will question and challenge this transformation as you will find that some educators computer illiterate. Through the point that Torres (1998), stated it would shape this study because there were different negative ideas and positive ideas of the NS educators on the usage of computers in teaching NS. So the challenges and questioning can help NS educators to understand and to be able to contribute in this new transformation and also through questioning and challenges there will be contradictions as there were contradictions in the different authors about the computer usage in schools.

The researcher used the critical theory because this theory argues to change the subject into new challenges. So, by involving the computer usage in schools it means that there are new challenges that the NS educators in their teaching will face them. The critical theory will be used in this study because it needs to explain how modern technology can be redesigned to adapt it to the needs of the free society. Critical theory rejects the neutrality of technology and argues instead that technological rationality has become the political rationality. Critical theory shows these codes invisibly sediment values and interests in rules and procedures, devices and artefacts that routinize the pursuit of the power and advantage by a dominant hegemony (Torres, 1998). This theory argues that technology is not a thing in the ordinary sense of the term but an “ambivalent” process of development suspended between the different possibilities. The technology is distinguished from neutrality by the role it attributes to social values in the design, and not merely the use, of technical systems. On the view of critical theory technology is not a destiny but a sense of struggle (Newman, F., & Holzman, L. (1993). Through this point these authors looking that the computer usage in teaching must be understandable so that there will be less struggle of contradictions in the educators with other stakeholders.

The critical theory states that there can be at least two different technological civilisations that based on the different paths of technical development. Through the critical theory the researcher argues that goals could only be achieved through emancipation, a process by which oppressed and exploited educators become sufficiently empowered to transform their circumstances for themselves by themselves (Nowlan, 2001:pp, 21). Critical theory saw the route to emancipation as being a kind of self-conscious critique which problematical all social relations, in particular those of and within the discursive practices of power, especially technical rationalism.

The critical theory was used in this study because it is necessary to emphasise that this work is social both in terms of what and how one critique. In the educational research critical theory is informed by the principles of social justice, both in terms of its own ways of working and in terms of its outcomes and orientation to the community. Critical theory involves strategic pedagogic action on the part of classroom teachers, aimed at

emancipation from the overt and covert form of domination (Hoy & McCarthy, 1994). In the research the critical theory is not a simply a matter of challenging the existing practices of the system but of seeking to understand what makes the system be the way it is, and challenging that, whilst remaining conscious that one's own sense of justice and equality are themselves open to question.

Critical theory has always occupied tenuous positions within the traditional disciplines and has always moved restlessly across disciplinary borders, after all when we think of what critical theory has influenced, we must include such diverse disciplines as sociology. Critical theory is by no means merely a province of English studies and neither need it should be (Freire, 1998). The value of education in the critical theory extends still further beyond the limits of work conducted within confines of a particular academic discipline and its attendant array of the fields of intellectual inquiry. Critical theory that will be used by the researcher in this study assumes that the social reality is historically constituted and that it is produced and reproduced by the people. Critical researchers recognises that, their ability to do so is to constrained by various forms of social, cultural and political domination.

The researcher used the critical theory because its main task is seen as being one of the social critiques, whereby the restrictive and alienating conditions of the status quo are brought of light (Freire, 1998). The researcher used this theory it was because it focus on oppositions, conflicts and contradictions in contemporary society and seek to be emancipator i.e. should help eliminate the causes of alienation and domination. Critical theory is a broad tradition based upon the use of the critiques as a method of investigation (McCarthy, 1991). This theory focuses on whose future, story and interests do the school represents. Critical theory argues that school practices need to the informed by the public philosophy that addresses how to construct ideological and institutional conditions in which the lived experience of the empowerment for the vast majority of students becomes the defining feature of schooling. The researcher used this theory it was because its main aim was that since the computers were used to teach NS it would create new forms of knowledge through its emphasis in breaking down disciplines and creating

interdisciplinary knowledge. The researcher used the critical theory because the critical question raise questions about the relationship between the margins and centres of power in schools and is concerned about how to provide a way of reading history as part of a larger project of reclaiming power and identity, particularly as these are shaped around the categories of race, gender, class, and ethnicity (Newman, 2000).

The researcher used the critical theory because this theory in schools is seen as resources for larger community. In this sense educators and the members of the community become co-owners of the school and doing so collectively determine what is taught, how the school is organised and what role the school might play in the affairs of the community and neighbourhood agencies (Torres, 1998). The researcher used critical theory because in schools it can be used as a strategic site for addressing social problems and helping students understand what it means to exercises rights and responsibilities as citizens actively engaged in forma of social learning that expand human capacities for compassion, empathy and solidarity. The researcher used the critical theory because in schools educators should construct curricular that draw upon the cultural resources that student brings with them to the school (Newman, 2000).

The researcher worked or used the critical theory because in schools educators must be able to critically analyse the ideologies, values, and interests that inform their roles as educators and the cultural politics they promote in the classroom (Nowlan, 2001). So the NS educators can able to critique the ideologies as in the literature review other authors are critiquing the usage of computers in teaching NS. The researcher used the critical theory because in education it is informed of principles of social justice, both in terms of its own ways of working and in terms of its outcomes in and orientation to the community. The critical theory operates at and between both the particularities of these teachers observations of actively in this classroom with these children of this day, and the broadly social and political questions of how schools operate and why (Turner, 1984).

Critical theory is a kind of negative but objective judgement, which transcends simple faultfinding. The critical theorist refer to the active involvement by the participants as

human agency and believe that despite the influence of oppressive reproductive forces, hope for transformation of the society is maintained because of the existence of agency. The critical theory assumes that schools are sites where power struggles between dominant and subordinate groups take place. Critical theory is deeply concerned with the art and practice of teaching it argues that educators must become transformative intellectuals and critical pedagogues in order to resist the oppression of the dominant ideology and to produce a liberating culture within schools (Freire, 1998). Through this point this study will be shaped because the teaching using computers may release the educators in the lot of stress and pressure so the computer usage will take out that oppression.

The critical theory was used in this study by the researcher believe that its task is to uncover the ways in which dominant ideology is translated into practice in schools and the ways in which human agency mutes the impact of that ideology. The researcher used this theory it was because it was aiming to uncover hidden assumptions that govern society-especially those about the legitimacy of power relationships and debunks or deconstructs their claim to authority, (Abercrombie, Hill and Turner 1984). The critical theory was used in this study because it refer to the involvement by participants as human agency and believe that despite the influence of oppression reproductive forces, hope for transformation of society is maintained because of the existence of agency. The critical theory shaped this study because in pedagogy (Torres, 1998) stated that educators will be draw from their own personal biographies, struggles and attempts to understand their own contradictions in the context of the contradictions of teaching using the computers.

The researcher used and work with a critical theory for the whole of this study because in educational research this theory is utilised to assess the relationship between schooling and society, to determine the relationship between knowledge, power and curriculum and to assess the nature of teaching methods. The researcher used this theory because this theory enters the educational research and schooling to increase the reflexivity of researchers, teachers and students alike. Critical theory challenges the legitimacy of knowledge and may advocate the incorporation into the curriculum of personal

knowledge and lived experienced of the students as legitimate knowledge (Rang, 1993). Through the point that also stated by (Rang, 1993) this study will be shaped by this theory because he stated that in teaching using computers the educators experience rage caused by the unjust circumstances that surround the educational experiences of the dispossessed.

The researcher used the critical theory in this study because through it cognition itself cannot be separated from their practical interests, thus positivism, by trying to separate facts from values, creates a misrecognition of such interests which guides such knowledge whereby subjectivity values are turned into objective facts (Wertsch, 1991). The critical theory seeks to penetrate the ideological mystification and forms of false consciousness which distort and individual's perception of present social conditions and thereby makes possible a practical emancipation from domination. The critical theory applied within educational research can be seen as a way of achieving emancipation through critical self-reflection, which presently is, cut short distorted communication which promotes technocratic domination. The critical theory shaped this study because this study look at computer usage in teaching the views of (Torres, 1998) support this study because he stated that educators and others need literacies that enable people to critically analyse the new electronic technologies that are shaping everyday life through the popular media, television and computers.

The critical theory suggests an alternative style of research one aimed not to control but rather at assisting individuals in discovering and pursuing their own developmental needs. A critical style of educational research would seek to assist individuals in discovering and then pursuing their own needs and their interests. The critical theory is more concerned with what social facts conceal rather than what they revealed the task then becomes one of demystifying the false appearances of the present to allow emancipation in the future. According to the views of Horkheimer (1982: 215) argues that the theoretical concerns must be translated into viable pedagogical tools if the social change is to be affected so that the theoretical presentation of the societal contradictions

is not merely an expression of the concrete historical situation but the also a force within it to the stimulate change.

In educational research critical theory would not ignore values but instead would use them as a guideline for research into such areas as the hidden curriculum and the ideological framework of schooling. Contradictions within schools and society at large are institutionalised in cultural and organisations can be seen as a microcosm of society, which reflects its alienation. The critical theory concerns with the relationship between parts that is between individuals, groups or organisations and the whole the society at large (Rang, 1993). The particular exists only in and through the totality of relations of which it is a part. An understanding of totality that embraces both the objective and subjective worlds must precede an understanding of its parts since the whole dominates the parts. Critical theory sees individuals as interacting within a matrix of intersubjective meanings which can only be understood by social scientists if they learn the language of their subject/object. The critical theory will shape this study because since the researcher was looking at the impact of computers in teaching NS so this theory shape this study as it create new forms of knowledge through its emphasis on breaking disciplines and creating interdisciplinary knowledge.

In educational research critical theory steps outside a positivistic mode of analysis of emphasising technological rationality and thereby emphasises the role rather than the function of schooling. The critical theory maintains that people's action and behaviour depend largely on their perception of the world around them. The connection between perception and action is important in an analysis beyond the correspondence theory (Bowles & Gintis, 1976). The critical theory is a kind of negative but objective judgement, which transcends simple faultfinding. It uncovers hidden assumptions that govern society-especially those about the legitimacy of power relationships and it debunks or deconstructs their claim to authority. Critical theory refers to active involvement by participants as human agency and believe that despite the influence of oppressive reproductive forces, hope for transformation of the society is maintained because of the existence of agency. The critical theory shaped this study because it raise

the questions about the relationship between the margins and centers of power in schools and is concerned about how to provide a way of reading history as part of a larger project of reclaiming power and identity.

Critical theorist believes that inherent in social organisations are contradictions, which act, as destabilising agents to force changed. Critical theory assumes that schools are sites where power struggles between dominant and subordinate groups take place (Roderick, 1997 pp: 34). A major theme of this work is an analysis of how schools are to help dominant groups maintain their positions of powers as well as how subordinate groups resist this domination. Critical theory view schools and classroom as sites of cultural production where people interact to construct meaning much like those working from the interpretivist theories (Newman & Holzman 1993). Critical educational theorists are deeply concerned with the art and practice of teaching. They argued that teachers must become transformative intellectuals and critical pedagogues in order to resist the oppression of the dominant ideology and to produce a liberating culture within schools.

Critical theorists believe that their task is to uncover the ways in which dominant ideology is translated into practice in schools and the ways in which human agency mutes the impact of that ideology. Critical theory and reproduction theorists agree that the purpose of schooling is to serve the interests of the dominant classes (Wertsch, 1991). Critical theory is emphasising the power of individuals to structure their own destiny and to ameliorate the oppression nature of the institutions in which they live. Critical theory shares a belief that it has merely substituted other forms of hegemonic domination that of the working class for the elitism of traditional capitalists or bureaucrats. Critical theorists have been concerned primarily with oppression of the working classes and because their models are based upon analyses in societies, critical theorists are consciously or not biased toward a working class European perspective.

The critical theory in education extends still further beyond the limits of work conducted within the confines of a particular academic discipline and its attendant array of the fields of intellectual inquiry (Torres, 1998). Critical theory in education is informed by

principles of social justice both in terms of its own ways of working and in terms of its outcomes in and orientation to the community. It involves strategic pedagogic action on the part of classroom teachers aimed at emancipation from overt and covert. Critical theory argues that school practices need to be informed by a public philosophy that addresses how to construct ideological and institutional conditions in which the lived experience of empowerment for that vast majority of student becomes the defining feature of schooling.

The critical theory creates the new forms of knowledge through its emphasis on breaking down disciplines and creating interdisciplinary knowledge (Rang, 1993). It raise questions about the relationships between the margins and centres of power in schools and is concerned about how to provide a way of reading history as part of larger project of claiming power and identity, particularly as these are shaped around the categories of race, gender, class and ethnicity. It rejects the distinction between high and popular culture so as to make curriculum knowledge responsive to the everyday knowledge that constitutes people lived histories differently. It illuminates the primacy of the ethical in defining the language that teachers and others use to produce particular cultural practices. The critical theory in schools should be seen as a resource for the larger community. In the sense that teachers and members of the community become co-owners of the school and in doing so collectively determine what is taught, how the school is organised, and what role the school might play in the affairs of the community and neighbourhood agencies.

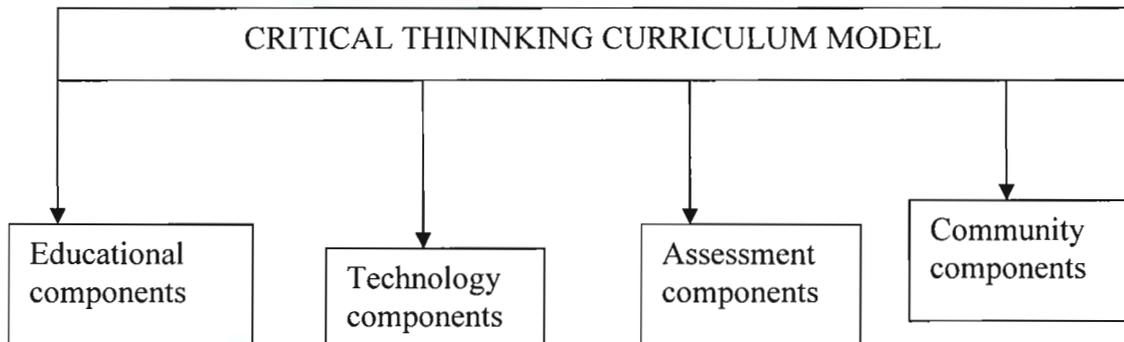
In schools the critical theory can be used as a strategic site for addressing social problems and helping the students understand what it means to exercise rights and responsibilities as critical citizens actively engaged in form of social learning that expand human capacities for compassion, empathy and solidarity (Torres, 1998). In schools critical theory foster public values and not merely advances excessive individuals, competitiveness and intellectual consumerism. The critical theory in schools work as the existing systems of schooling must give teachers more powers to control their own work conditions and to implement educational programs (Freire, 1998).

Critical theory in schools can make the educators to experience rage caused by the unjust circumstances that surround the educational experiences of the dispossessed (the poor, minorities and other marginalized people). While being fully cognizant of the immense struggles to be faced to achieve the goal of social equity they are committed to the notion that education can be a transformative process (McCarthy, 1994). Critical educators draw from their own personal biographies, struggles and attempts to understand their contradiction in the context of the contradictions of schooling and capitalism (Torres, 1998). Critical theorist in education combines theory with political, cultural, and educational practices in unique ways.

In this study the researcher used the critical theory and this theory has the different models. The researcher used the Critical thinking curriculum model because this model is divided into four components and these components are the one that are fitting exactly to this study

### 3.2 CRITICAL THINKING CURRICULUM MODEL

Fig. 1. (R. Alexander, 2001)



### 3.3. Technology component

The critical thinking curriculum model is a model that belongs under critical theory. It is a design tool that educators can map the project to the state and National Standards and Benchmarks within the given content area (Paul, 1995). This model requires the use of telecommunication for research and collaborations with the other participants. Through this model the educators will need to demonstrate their acquired knowledge through portfolio's and multimedia presentations and this will help the educators to engage in the active teaching and learning. In technology this model defines as computers with Internet access, multimedia tools and other software programmes that will and in the acquisition collaboration and communication of information (Elder, 2000). In teaching this model is used to develop the critical thinking as an area of great potential in education.

### 3.4. Educational components

The educational component is divided into five areas and they include constructivism, Socratic dialogue, critical thinking, collaborative relationships and multidisciplinary

approaches. The constructivism is looking on building ideas on the prior knowledge and gives educators an opportunity to make sense of the world by engaging them in exploratory investigations (Wertsch, 1991). The Socratic dialogue look teaching as to develop and evaluate the critical thinking by making it explicit. It also approach teaching through questioning, probing the understanding, helping the educators to develop their own thinking skills. The critical thinking emphasizes the explanation, demonstration and application of the acquired knowledge. Multidisciplinary approach in teaching curriculum reflects that science should be integrated with other subjects (Torres, 1998). The collaborative relationships in teaching promote the meaningful interaction through problem solving among students and educators.

### **3.5. Assessment components**

The assessment component is a component that utilized to clarify and understand the level of knowledge that an educator obtained (Rang, 1993). This component actually measures what it is intended to measure and its primary characteristics are to test the validity and allow educators to use this method to assess skills and abilities. The evidence of the validity needs to be gathered and shown explicit for each purpose for which assessment is used.

### **3.6. Community building component**

This component in the community can be found a plethora of individuals who will be valuable resources during the development and implementation of your curriculum (Freire, 1998). It determines the real world issues on which needed to be focused on them and that need to be developed. After developing the good idea of what direction to take the curriculum

### **3.7. CONCLUSION**

This chapter outlined some the theoretical assumptions to human learning. The ideas of the different authors provide the importance of being practically and clearly of the critical theory and how it work in the teaching situation and how can it must be applied.

**CHAPTER 4**  
**RESEARCH METHODOLOGY**

**4.1 INTRODUCTION**

The research methodology that was used in this study was the qualitative methodology. The qualitative research is the research that focuses on understanding, rather than predicting or controlling, phenomena (Newman, 2000 & Wiston, 1997). It includes the discussion and practice in basic phenomenological description, structural analysis, research interviewing and the repertory grid. The researcher used the qualitative research because through this methodology the researcher can be able to explore attitudes, behaviour and experiences of the participants through the interviews and observations. This chapter covers the ethical guidelines, limitations, sampling procedures, research methods and research instruments that were used for data collection.

**4.2 ETHICAL GUIDELINES**

In conducting this study the researcher had been ensured that all the participants they would be treated equally and also respected (Newman, 2000). The participants that were participating were assured that the information that they gave would be used for the research purposes but not to expose their weaknesses to the public. In conducting this study the researcher had been ensure the participants that their names and schools names would not be written down but the researcher would use the symbol X to represent their names and the school names. The researcher did this because it might be easier to other people to trace them and their school names. During the interviews some NS educators were willing to disclose a lot of personal information concern about teaching NS using the computers so this demanded the researcher to make sure that both the participants and the information they provided would be treated honestly and respected. In conducting this

study the researcher assured the participants that they must not be vulnerable because of their age, social status and position of powerless.

The researcher was making sure that the ethical standard was maintained and respected throughout the study. In conducting this study the researcher had tried by all means to minimise the disruption to the participant's lives if in these interviews there was something found that upsetting their experiences, so this lead the researcher to find out why and try to ensure that the same situation will never occur again. In doing this study the researcher did the best in making sure that the anonymity and confidentiality information given by the research participant was confidence and respected. In terms of anonymity the researcher was expected to show that what did the participants say could never be traced back to them when the final report is produced. The researcher was demanded to be careful and not make the promises that cannot be kept. In terms of confidentiality the researcher was demanded to ensure the research participants that the information they supplied to the researcher was not be disclose to the third parties. The researcher in doing this study was expected to categorise and store the information so that it cannot fall into unscrupulous hands. In doing the final report the researcher informed the participants that they must know what is going to happen with the results.

The following ethical guidelines were adhered to:

- ❖ The researcher ensured the participants that in this study would never be suffered confused and distress.
- ❖ The information gathered was kept confidentially and was used for research purposes only. (Casewell, 1982).
- ❖ All participants were treated equally with respect and concern for their well being.
- ❖ The researcher in this study was ensured the participants that the study will not take advantage so that they will not able to lose trust and confidence.
- ❖ The participants will be informed about all aspects of the research that might influence their willingness to take part and the information that they provide will was kept confidentially.

- ❖ The researcher was ensuring that the participants that their weaknesses as well their problems will be kept confidentially.
- ❖ The researcher informed the participants that after it finish to collect the data the researcher will do the transcript and then take it back to them to read it so that they will have a chance to highlight the information that can be used for this study and cancel that they don't want to be used. The researcher did this because it was protecting the participant's rights and because the participants can sue the researcher if it publishes information they don't want to be published.

### **4.3 LIMITATIONS OF THE STUDY**

This study was limited because these four schools were at the rural areas where it was difficult to the researcher to reach them if was raining because of slippery roads so this demand the researcher to cancel the appointments were planned as there were no transport if it was raining. The study was limited because these four schools were far away to each other and even the transport was very poor so the researcher was not been in these schools at the time for the appointments. The researcher was not forced to conduct the study in these schools that are in these rural areas but they were targeted because they were having all these that were needed for this study to become successfully and they were in same area so that's why the researcher targeted them. The study was limited because the other NS educators were afraid to be interviewed because they were thinking that the researcher was testing their level of understanding and knowledge concerned with teaching this subject using computers.

The study was limited because the participants were afraid to be interviewed and observed because they were thinking that the researcher will able to expose their strengths and weaknesses to the public. The study was limited because the data that was collected by the time schools were preparing to write the exams so these NS educators were busy focus on the exams. The lack of money also limits this study because the researcher was demanded to hire the transport so as to reach at these schools at time. The study was also limited because these NS educators that were interviewed were always

postponing the appointments that we planned with them for the interviews. This study was limited because in school X the principal gave the researcher 30 minutes to conduct the interview because the principal said there is a shortage of teachers so these interviewees were supposed to go to invigilate.

The study was limited because the attitude of the NS educators that were interviewed was not in a good manner because others were saying I just interview them with an aim of undermining them and also testing their level of understanding concern with usage of computers to teach NS. The study was also limited because when the participants receive the transcripts there were some information that they disallow the researcher to use it and they ask the researcher to withdraw it because they said it will be able to expose their weaknesses as well the weaknesses of their schools to the public. The study was limited because during the interviews the participants were saying that the researcher is testing their understanding, skills and knowledge of teaching NS using computers. Through this point it was the one that made these participants to have this negative attitude that the researcher was undermining them and searching them about their teaching of NS using the computers. The study was limited because in one of these four schools at the beginning they refused to give the researcher an access to conduct the study because they were thinking that the researcher was sent by the Dinaledi project to come to explore and to investigate that did those computers used for good purposes.

#### **4.4 SAMPLING PROCEDURE**

This study used the qualitative because it gives the ability to generalise the work to the whole research population by describing and explaining what was happening to the smaller group of people (Newman, 2000). The researcher uses the smaller group because their belief might provide the insight into the behaviour of the wider research population. When the researcher was conducting this study it was usually possible to involve only the NS educators that were teaching this subject using computers as this study was basically focus on them. The probability sampling was used because the qualitative methodology focuses and deals with the small sample. The researcher use the probability sampling it

was because all the people within the population have a specifiable chance of being selected so even these NS educators that were the part of this study were having that chance of becoming selected.

The researcher uses this type of sampling because it allows the researcher to be able to predict and generalise for the whole population (Strauss & Gobin, 1998). Caswell (1982) define sample 'It is a subset of the population'. For example the sample is the total number of people relevant to the study, that are chosen to be questioned and that will be able to represent the total population. The researcher uses the purposeful sample it was because the findings were not being able to be generalised for the entire population. The target population for this study were the eight NS educators that were teaching NS using the computers. There were 8 educators that were interviewed and observed, because the researcher was targeting to go in-depth in collecting the data that was why the number of NS educators was very small. There were four schools that were selected to be the part of this study. These schools were selected because they use the computers for teaching and learning, they were offered these computers by the Dinaledi project. So by using these schools it gave the researcher an advantage because they were having an understanding of how to use the computers and how to operate them for teaching and learning. These four schools that were selected for this study were at Umzinto area in the South coast of Kwa-Zulu Natal.

#### **4.5 INSTRUMENTS USED TO COLLECT DATA**

The researcher collects the data by using the interviews and observations. The semi-structured interviews were used to collect the data. The semi-structured interview was used to collect the data for critical question 2 and 3. The reason for using the semi-structured interviews was because it has the flexible questions where the interviewer can probe further with questions to the responses of the interviewees (Newman, 2000). The data was also collected for critical question 1 by the usage of observations. The NS educators were interviewed before they start their lessons and also after their lessons. The researcher was using the semi-structured interviews it was because it's where the

researcher can do the follow up questions to the responses on the participants. These NS educators were interviewed two times because the researcher was aiming to compare the information that they gave to the first interviews and with of the second interview so as validate the information that they gave.

The main aim of using the semi-structured interviews was that this study involves the small number of the participants so the researcher was suppose to use this type of interviews with aim of collecting a lot of data and to go in-depth in data collection (Strauss & Gobin, 1998). The data was collected in these four schools the aim was that the researcher was aiming to collect the data in small sample that at the end it will represent the large population to get the perceptions of the NS educators about teaching this subject using the computers. The semi-structured interviews used for two critical questions it leads the researcher to make the interviews into two parts where the part one consists of the impact of computers in teaching NS and part two was consisting the perceptions of NS educators about teaching using the computers.

The open-ended questions for the interviews were used to interview the NS educators where they were supposed to give their responses as much as they can. The advantage of open-ended questions was that it allows the participants to provide with a wide range of detailed responses and also permit a researcher to potentially discover many relevant attitudes and experiences being studied. There were sub-questions under each critical question because the researcher was expecting to collect the data that were in order. The advantage of semi-structured interviews was that the researcher was able to get the advantage of able to see the action, attitude and the feeling of the interviewees (Newman, 2000).

The interviews were the best in colleting the data of this study because the researcher was getting the direct information from the participants and the researcher was able to rephrase the question if the interviewees were also asking for clarification (Wiston, 1997). The interviews were used in this study because they were less expensive and were having advantage of taking a less time to collect as the researcher questions were cleared.

The purposeful observations were used in this study since the observations was the instrument to collect the data for critical question one. The NS educators were observed in their classes of how they use the computers to teach NS. They were observed after they were interviewed because the researcher was aiming to validate what they said to the interviews was the same to what they do in the class.

The researcher use the semi-structured interviews it was because interviews is an essential tools for gathering information from people who might have difficulties with the wording of written questions or if some are more literate than others (Newman, 2000 & Wiston, 1997). The researcher was using the semi-structured interviews because it increases the significance and relevance of questions. The semi-structured interviews that was used were built on the emerge from observations where the interview were matched to individuals and circumstances (Newman, 2000). In semi-structured interviews questions were asked in the natural course of teaching using the computers. Since the researcher was using the semi-structured interviews the researcher notices that different information was collected from the different people and this information was less systematic and comprehensive since there questions that were arise to probe further in the responses of the interviewees.

The semi-structured interviews that the researcher used was providing a framework within which respondents express their own understanding of teaching NS using computers. In this type of interview the researcher was aiming to know the specific information concern with the teaching of NS using the computers and then can be compared and contrasted with the information gained in the other interviews. To use this type of interviews the same questions were asked in each interview by doing this the researcher want the interview to remain flexible so that other important information can still arise. In doing these interviews the researcher produces the interview schedule that was having the list of specific questions or list of topics to be asked or discussed (Strauss & Gobin, 1998). This was taken to each interview to ensure the continuity. The interview schedule was always updated and revised after each interview with the aim of including more questions which had been arisen as a result of the previous interview.

## 4.6 RESEARCH METHODS

When the qualitative approach seems to make the most sense in terms of these factors, the task becomes one of selecting the qualitative methods to be used. Lee, Mitchell and Sablynski (1999) suggested the seven types of qualitative research methods and they stated that they are most common.

- Interpretive qualitative method- This method is used when the goal of the researcher is to understand how the participants make meaning of a situation.
- Phenomenology- This method focuses on the essence or structure of the experience.
- Grounded theory- This method has its goal the development of a theory through inductive approaches.
- Case study method- It is the method that is intensive description and analysis of a phenomenon or social unit such as an individual, group, institution or community.
- Ethnographic- This method is focuses to the study the human society and culture.
- Narrative Analysis- This method focuses on the first person accounts in story form, biography, autobiography, life story, oral history, auto-ethnography and life narratives are use in data analysis.
- Critical qualitative research- This method focus to uncover, examines and critiques the social, cultural and psychological assumptions that the structure and limit our ways of thinking and being in world.

This study would use the case study method or it uses the case study research method because it was used to describe the unit of analysis or to describe a research method. The researcher use the case study method because it is the most common in the qualitative method used in information systems (Orlikowski and Baroudi, 1991; Alavi and Carlson, 1992). The case study can be a single or multiple case designs where multiple design follows a replication rather than sampling logic (Newman, 2000). The case study used in

this study because its evaluations can cover both process and outcomes because they can include both quantitative and qualitative data. Case study is depending on a single case renders it incapable of providing a generalising conclusion (Yin, 1993). This study is a case study because it is done by giving special attention to completeness in observation, construction and analysis of the case under the study.

The case study is done in a way that incorporates the views of the actors in the case under the study (Newman, 2000). The researcher uses the case study method because it uses the interviews and documentary materials first and foremost, without using participant observation. The researcher uses the case study because it spends a lot of time in the same field. The case study method can be positivist, interpretative or critical depending upon the underlying philosophical assumptions of the researcher. The researcher firstly stated these research methods; this study will employ and use the case study method because this method states that the researcher need to understand the goal of the world. The main goal of this study was to understand how the NS educators use the computers in teaching the NS subject. The case study method was used because the researcher must uses the interviews and documentary materials first and foremost, without using participant observation (Wiston, 1997).

The researcher was aiming to understand the impact of computers to the NS educators since they teach NS using the computers. The researcher was also to find out the perceptions of the NS educators about teaching the NS using the computers. In terms of perceptions the researcher looks in terms of their feeling, views and their ideas and their understanding of teaching NS using computers. As the researcher was doing this study the main objective was to understand how the NS educators manage to use the new methods for teaching using computers and how are the outcomes. The researcher uses the case study method because it is distinguished to the ethnography because in the case study method the researcher spends a significant amount of time in the field (Newman & Strauss, 1998).

This study was aiming to understand how the NS manage to work or to overcome the problem-solving activities using the computers. According to Merriam (1998) the interpretive qualitative method seeks to discover and understand a phenomenon, a process or the perspectives and the worldviews of the people. So as the researcher was doing this study it was aiming to discover and understand how the computers influence the teaching of NS and how the world understands the usage of computers for teaching process. According to Dey (1998) the case study method preferred the interviews, focus groups and observation for the data collection along with the comprehensive literature review which takes place throughout the data collection.

#### **4.7 CONCLUSION**

This chapter explained how the researcher went about answering the critical questions that were identified. It clearly outlines the specific approach within which the research was conducted in order to answer those critical questions. The interviews as well with the observation were the appropriate tools to investigate the impact of computer technology in teaching NS in grade 8 classes.

## **CHAPTER 5**

### **FINDINGS**

#### **5.1 INTRODUCTION**

The findings of this study are deduced both from the literature review that is chapter 2, theoretical framework that is chapter 3 and results of an investigating conducted as indicated in chapter 5. The latter was carefully and systematically executed according to preconceived plan, in order to derive at valid conclusions about the findings. The findings in this study are presented in the following format: In under each question there answers that are provided followed by the table and with the description of the table.

#### **5.2 What do you understand by the term computer technology?**

In the data that was collected the researcher find that 75% of the participants had an understanding of what computer technology is because they define the computer technology as the technology that used to transfer information via the computers where it is installed in the computer programs. They also define the computer technology that is about computers to retrieve the information via the Internet and the information that is not accessible in schools and in libraries and in other sources of information. The researcher also find that other participants have no understanding of what computer technology is, because 17% of NS educators that define the computer technology as the program that is designed for the educators as well with the learners for teaching and learning. The researcher also find that 8% of the NS educators define computer technology that it is a tool that is only based on acquiring the skills and knowledge.

**Table 1**

**Educator's definitions of computer technology**

No of the NS educators that were interviewed and observed.	12	100%
NS educators that have an understanding of what computer technology is	9	75%
NS educators that have no understanding of what is computer technology	2	17%
NS educators define computer technology as a tool for skills and knowledge	1	8%

Table 1 shows that 75% of the NS educators that were participating in this study had a better understanding of what computer technology is because their definition is related and similar to the definition that was given by Venkatiah (1996). He define the computer technology as the system that is the combination of telecommunication and computing to obtain the process, store, transmit information in words, pictures and in numbers. So the definition of the participants is related to the definition of Venkaiah (1996) because the core of these definitions is that computers technology is a tool to transmit the information.

### **5.3 What computer technology do you have in your schools?**

In the 4 schools that used were in this study they stated that the computer technology that they have are the computers which they were offered by the Dinaledi project. This means that 100% of the targeted schools had computers but 3 schools use computers for teaching and learning and there is one school at the present moment that is not teaching NS using computers. These schools are using computers for teaching and learning in all subjects. The NS educators stated that they received or offered 23 computers because they were offered by the Dinaledi project. As there is one school that is not using the computers for the process of teaching and learning of NS subject but they have the understanding of how to use the computers but the only thing is that the principal are not allowing them to teach NS using them since this schools have no computer laboratory. They have the understanding of teaching using computers as they are from tertiary level that they come from them.

This project do not know that these computers are not used for teaching as the aim of offering these computers in schools was to support and increase the educators and learners performance in maths, science and technology. The schools that are using computers for teaching NS they stated that they use these computers during the lessons until the end of the lessons but they are not using them if they are introducing the lessons. In these schools that are teaching NS using the computers they stated that computers has a positive impact in time consuming since the teacher manage to finish the work that its prepared for the day.

**Table 2**

**School using computer for teaching of NS**

	Numbers	Percentage
Schools using computers for teaching NS	4	100%
Schools using computers for teaching NS	3	75%
School not using computers for teaching NS	1	25%

Through the table that is shown above it means that in 3 schools computers are used in teaching and learning of NS. So in one school they have the computers and they are not using computers because the teacher that was responsible for operating these computers had gone through the process of Post Provision Norm (PPN) and these results on making computers not work. These schools that are teaching NS using the computers stated that computers has a positive impact because it make the learners and educators to be independent and since these schools they are in the rural areas where there are limited number of the libraries and the resource centres. These schools stated that the usage of computers in their schools has a positive impact because they were having the limited number of the textbooks so by having the computers it makes things become easier to them because some of the information they collect from the computers.

**5.4 How often do you use the computers?**

These NS educators that they use the computers for teaching NS stated that they use computers for 3 to 4 days a week because they don't have enough resources so they rely

to them as they had a limited number of resources for teaching NS. They also stated that these computers are most use to teach the theories but for the practical work they don't use it. These NS educators stated that these computers are mostly use for the science subjects as the Dinaledi project offers them these computers with the aim of improving the standard and performance of the science subjects. These NS educators stated that computers in teaching has a positive impact because they stated that by teaching using the computers you can teach something for 4 days where in the traditional methods it can takes about 2 to 4 weeks.

### **5.5 What impact computers do they have on teaching NS?**

The NS educators stated that computers in teaching NS has positive impact because both the educators and learners are become centred to the lesson since they just punch the computers as they are programmed for all the NS lessons. They also sated that computers have a positive impact because it makes them to become multi-skilled rather than to become knowledgeable. The teacher X stated that computers in teaching NS the computers has a positive impact because the science subjects are look difficult subjects so through the computers the NS educators and learners become interested to teach and continue teaching this subject and to continue with this particular field. The NS educators stated that computers in teaching NS subject have a positive impact because it enhance and develop their teaching strategies and their methods and also upgrading their teaching outcomes. There are 75% of the NS educators that have saying computers has a positive impact.

Through the usage of computers in teaching NS the educators were stating that the computers in teaching had a negative impact because it will affect the process of teaching and learning since in the class there are the slow learners and with the brilliant learners so that will create the gap or it will create the division among the learners. The 15% of the NS educators that are having the negative feeling in teaching NS using the computers because they stated that the training workshops that they receive were not enough for them to follow this recent change or transformation. They also have the negative attitude

towards the usage of the computers in teaching NS because they stated that they were trained for 3-4 years in tertiary institutions for these teaching methods that are changed with the few weeks of training workshops of 2-3 weeks.

### **5.6 How do you feel to teach NS using computers?**

The NS educators has a feeling that they support the usage of computers for teaching NS because 75% stated that as they are working on the rural schools where there are no libraries and other resources so the computers usage had close that gap. Their feeling is positive because they stated that it develops and promotes their teaching strategies and their methods of teaching this subject. NS educators in those schools were having the positive attitude about the usage of computers and their feeling was also positive because they said that their school has limited number of materials so for teaching NS and also the other subjects so by using the computers it will become easier. The NS educators were having the positive feeling because they stated that it will uplift their standard of teaching in their schools and decrease the failing rate of this subject because now they have enough information as they are more relying to the computers.

The NS educators were having the positive feeling about the usage of computers in their schools because they stated that since they don't have the libraries and other resource centres for learners and for educators. So they are relying to these computers because if they are given the learners researches it was difficult before as there were no libraries or other resource centres where before. The 75% NS educators are having the positive feeling in teaching NS using the computers because they stated that it will push the boundaries to the learners and to the educators where they will able to be centred to the lesson where the learners will never be relying to the educators but they suppose to contribute to the lessons and the educator will be facilitating. The usage of computers in teaching limiting the teacher in dominating the lesson because now the educators work together with the learners with a same pace.

### **5.7 What impact does computer technology have on teaching strategies?**

The 15% of NS educators stated that traditional methods that they used to teach were well perfect for them because it makes easier to them to teach this subject because, it makes the to be easier to identify the slow learners and the learners that are having problems concerned with the subject as concerned and it was easy to target the goals. This 15% of NS educators stated that computers in teaching have a negative impact because it changes their teaching methods that they are used on them from traditional methods to technological methods. They also stated that computers in teaching NS has a negative impact because it affected the teaching and learning outcomes and also their visions about this subject through the usage of computers.

The other NS educators has a negative attitude towards the usage of the computers in teaching NS because they stated that it will create the division between the learners from the poor families and also in poor schools. Those learners from the rich families are also using the computers at their homes so those from the poor families are not having computers at home. They also having the negative perception because they stated those computers in teaching will make the learners to be independent and this will make these learners to work on their own pace and not taking the pace that will be ordered by the teacher and at the end it will become difficult to manage them since they will work individual in each computer. They stated that computers in teaching will make the educators and the learners to become lazy as a result the syllabus will never be finished on the expected time since the educator will just told the learners that they must do something and sometimes the learners will play the games on the computers during the teaching and learning process as they will never what they expected to do.

The 15% NS that are having the negative attitude in teaching using the computers because they stated that it will open the gap between the educators that are computer literate with those that are computer illiterate as those that are computer illiterate will always need help to those that are computer illiterate. These NS educators stated that by

involving the computers in teaching NS in school had affected them because now through the presence of Post Provision Norms (PPN) in schools it affected them as they are computer illiterate yet they have a lot of experience in teaching NS than those than one new in the field cause they have a less experience. They are having the negative attitude in the usage of computers because they stated that it affect their vision and goals to them and to the learners, as this system of teaching NS is not understandable to them.

The 75% NS educators are showing the positive attitude towards the teaching the NS subject using the computers because it will make them to communicate easily with the other NS educators from the different school by using the Internet. They stated that it will help them in the problem solving of the subject since there are the e-mail addresses to what problem they face with it they can send a message. These NS educators are having the positive attitude because they stated that it will reduce the paper work for them since before there were limited paper of work than now as every thing like tests, class work, homework's, etc as they will be saved in the computers in schools.

### **5.8 When do you use these computers?**

The participants stated that their schools have computers that mean that 100% of the schools that were used and targeted in this study have the computers. In these schools that were used in this study not all that NS educators are using the computers because other interviewees 25% just stated that the computers were offered last year but they never use it up until now as they are kept in the principals office. The 75% interviewees stated that the computers in their schools are working but they have an educator that is operating for them before they start their lessons as everything is kept in the computers. In the data collected the researcher find that in the 25% of the participants they stated that their schools have the computers but they never use them so it means that those educators are computer illiterate since they were also the one's that they were having the negative attitude towards the usage of computers in teaching of NS. These NS educators that are using the computers in teaching stated that they use the computers during the lesson with the aim of making learners to be centred to the lesson. They also stated that they use

computers for the assessment and also for recordings. They stated that the computers are used to create the integration between the learners and with the educators. These NS educators stated that the computers are used in teaching for the communication purposes where they communicate with other schools via Internet.

**Table 3**  
**Computer usage in these schools**

School with computers	4	100%
Schools using computers for teaching NS	3	75%
Schools have computers and not using for teaching NS	1	25%

### **5.9 How did you use these computers in teaching?**

In these schools the 75% of interviewees stated that the computers are used in their school in all subjects since they bought the different software and they also have the programs that they were offered by the Dinaledi project like M.I.P. The programs that were offered by the Dinaledi project were not for all subjects but it was for Mathematics, technology and science. These programs were because they need to increase the performance and the standard of the pass rate in the learners in the rural schools. In one of the school they stated that the educators have no access to the computers only the principal, deputy principal and the head of departments that they have the access of using the computers but not the staff.

In 3 schools that they use the computers for teaching the NS subject they stated that the computer usage in teaching is decreasing the teaching and learning outcomes. In 1 school they stated that computers are not working because the qualified educator that was

responsible for operating the computers and servicing they had gone through the process of PPN.

#### **5.10 What is the main aim of teaching using the computers?**

These NS educators stated that they are using computers for teaching and learning with the aim of making the learners to acquire the computer skills. They use computers with an aim to promote and develop the outcomes as well with the science subjects. They also used the computers with the aim of training the NS educators to be well updated and be ware of school recording like the school marks, assessment criteria, teaching lessons etc for the school recording. The stated that the usage of computers is helping them for the time consuming. The 50% teachers stated that it would release the pressure and stress that was behind the teachers and make the learners as well with the educators to be centered to the lesson.

#### **5.11 What challenges do you face with them in teaching using the computers?**

About 75% of the NS educators stated that computers in teaching this subject have lot of challenges because it demands the educators to have the lot of NS information. They stated that NS educators must be more computer literate so that it can be dominated with the computer skills to the learners because if the learner have the computer skills more than the educator it will push and put a pressure behind that particular educator and this educator will fell undermined by the learner. They stated that computers have the challenges because it will make and force the educators to communicate with the other NS educators from the different schools where sometimes it don't like. The NS educators from these schools stated that the computers in teaching of NS have the challenges because they said that the learners like to delete what is install in the computers so it demands them to install for several times.

About 65% of NS educators they stated that by teaching using the computers it has the challenges because it makes other learners to grasp not easily since they rely to the

textbooks not a lot of information about the NS information computers. It has a challenge because it makes the learners to get the information on their own and it has a challenge since they work on their own pace. Computers has a positive challenge on teaching the NS subject because it will make the teachers and learners to be broadly minded rather than to be narrowed minded as they depend to the textbook.

About 10% NS educators are stating that the usage of computers in teaching has the negative challenges because the NS educators are not well trained to use the computers for teaching. They also stated that they receive few training workshops and they were not enough because they are still computer illiterate and they also lack with the computer skills for teaching this subject. The NS educators are stating that computer usage has the negative challenges because it demands the educators to change their teaching strategies where they are trained. They stated that computer involvement in teaching has the negative challenges because it will demand them to go and upgrade themselves so that they will become fit to teach using the computers. They have other problems so this will lead them to leave this field immediately they upgrade because it shows to them if there are other teaching methods that might come they will be needed to change.

The most NS educators are stating that computers in teaching have the challenges. The 75% of the NS educators have stated that computers in teaching this subject has the positive challenges because it develop the NS educators as well with the learners to be familiar with the science, technology and commercial skills. They also sated that it play a significant role since it motivate and developing the learners as well with their educators so as to make them to be more wide advance and marketable skills. They stated that it act as the inter-link between the secondary and the tertiary level. The NS educators are showing the positive attitude on teaching NS using the computers because they stated that it develop and promote their teaching strategies as well with their teaching methods through the training workshops that they were offered by these projects.

The 8% of the NS educators are stating that the computers in teaching NS has the negative challenges because it make the learners to become out of control by the educator or it limit the co-operation between the learners as well with their teachers and this result that educators become unclear if the learners not follow the lesson thoroughly. This 8% stated that in their schools computers has a negative challenges because in their schools about 1% of the learners has the computers at home so it demand them to upgrade their computer skills as they are under pressure as sometimes these learners also help them in conducting their lessons if they become stuck. The NS educators are having this negative attitude of teaching using the computers because they stated that they are trained for about 3-4 years in the tertiary institutions to teach NS using these traditional methods but what they had been trained changed by the training of about 2-3 weeks.

They are having the negative attitude because they stated that through this transformation it would lead them to become the victims of Post Provision and Norms since they are lacking with the computer skills for teaching this subject. These NS educators are having the negative attitude towards the usage of computers in teaching NS because they stated that the training workshops were not suitable because sometimes if you ask the training workshop co-ordinator some question they just told them to write down the comments and they will answer them later. Through this transformation they never get any proper approach from the government concerned the usage of the computers in teaching where the government must ask them to upgrade before this was implemented.

This 8% NS educators are having the negative attitude about the usage of computers in teaching in their schools because they are stating that through computer usage there is a gap now between the educators that are computer literate with those that are computer illiterate. They stated that this is caused by this in most cases for operating the computers they ask for help to those that are computer literate and sometimes they refuse to help or sometimes they are busy so they become afraid to help them. These NS educators stated that as the computer usage for teaching NS the teaching outcomes are more affected because this is a transition from one method of teaching to the other one so it will affect

the outcomes. They stated that the outcomes are affected because the NS educators are not well used and grasp well the computer usage in teaching.

The 25% NS educators are not having the negative attitude and also they are not having the positive attitude about the usage of computers in their schools. They stated that it is new curriculum so they can not judge that computers has negative challenge or a positive challenge but they will judge after all educators are well used in teaching the computers and they well grasp in computer skills. These NS educators stated that since it is a new transformation computers can affect the teaching strategies and other methods of teaching if the NS educators are not well trained and if they are not well followed by the trainers. In terms of the outcomes they stated that the computers can affected the teaching outcomes and sometimes cannot affect the outcomes of teaching using the computers. Through this point they stated that the outcomes depends to the understanding the content of the subject in more details by the educator because the educator can be perfect in teaching using the computer yet an educator not perfect in understanding the content.

This 25% does not show any challenge of the computers but they are neutral because in terms of the gap between the NS educators that are computer literate and those that are computer illiterate they stated that it depends to the communication of those educators and how they are committed in their school work. They also stated that it depends to their attitude to each other on the particular fields of teaching how they understand the situation and position of each other in the field. In terms of the learners performance they stated that the learner's performance will able to depend and determined the educator understanding about that subject where if the educator has no understanding the performance will never be good but if it had an understanding it will be good.

The 25% of the NS educators are not having the understanding of how to use the computers for the teaching and learning process. They stated that after they receive the workshops from the Dinaledi project they just get only two training workshops so this result them having not enough understanding so they decided not to use these computers in teaching. They also stated that since they are new in the teaching field of this subjects

the lack of communication between them with their Head Of Department (HOD) lead them not to have the better understanding of using computers in teaching this subject. The lack of training workshops that they were supposed to attend is contributing to make them to be not having the understanding of teaching using the computers. They also stated that they don't have the understanding of teaching using computers because even now in their schools computers are only the office use material and the other are not used but they re kept in the principals office.

Those that have no having the understanding of teaching using the computers they stated that even the Dinaledi project is contributing since the offering of these computers is to increase the performance and standard of mathematics, technology and science but no follow up done that these computers are doing the purpose or not. They stated that from now they will never judge that the computer usage for teaching NS has a positive or negative challenge because since they never use them it is difficult to them to judge. About the teaching strategies they stated that they are still using the traditional method for teaching this subject and their outcomes are still good. They said they don't know how will be the outcome goals after they started to use the computers for teaching the NS subject.

**Table 4**

**Challenges of teaching using computers**

Educators that have positive challenges about teaching NS using computers	75%
Educators that have the negative challenges on teaching NS using the computers	15%
Educators that are using computers for teaching and not having the negative and positive challenges of teaching using the computers (Educators that they have the neutral attitude about the computer usage in teaching)	8%
Educators that are not using the computers for teaching NS	2%

**5.13 As you are teaching NS using computers what qualifications that you have?**

In the table below it shows the qualifications of the participants in this study. This table shows that there are 4 NS educators that have the Degree's and there are 8 NS educators that have the Diploma's. These 4 NS educators has a full understanding of what computer technology is because their definitions are more related to the definitions of the different authors. They have an understanding of computer technology because they also did the course of technology in education from the institutions that they come from them or that they were studied on them. So through their qualifications that they had it give them the understanding of technology as well with computer technology. Those educators that they have the diploma's have the understanding of computer technology and technology in a broader perspective after they had been attended the training workshops after the

technology were introduced as a subject. Through this it gave them the baseline of what computer technology is. They are helped by these workshops because they stated that in the colleges that they were on them they never did any course or module that involves the technology as such since they were in colleges in 6 years back.

**Table 5**

**Qualification of the NS educators that were interviewed**

Qualifications	Numbers	Percentage
BA, HDE	1	8%
BA, HDE, BEH	3	25%
STD	4	33%
SPTD	3	25%
JPTD	1	8%

**5.14 How the experiences that you had helping you in teaching NS using computers?**

The table below will be able to show the experiences of the NS educators has in teaching NS. There are 3 NS educators that have less than 5 years experiences in teaching. There are NS educators that come from the Universities and these are the NS educators that have a full understanding of what computer technology is because 2 of them major with it as a subject/course. The other 1 NS educators have a better understanding of computer technology after it continues with its studies. There are 6 NS educators that has more than 5 years experience in teaching NS, but there is only 1 in them that has a better understanding of what computer technology because at the present moment is doing ACE in science and technology so that is why he has this better understanding of computer technology. The other 5 NS educators less information about computer technology because after the technology introduced they attended the training workshops so they had the information but is not advanced. The other 3 NS educators has more than 10 years

experience in the teaching field of teaching NS and they are same with the 5 educators that stated above as they have little understanding after training workshops.

**Table 6**  
**Experiences of the interviewees**

Experiences in teaching NS	Numbers	Percentage
1-5 years	3	25%
5-10 years	6	50%
10-20 years	3	25%

In terms of the gender there are more female that are teaching NS using the computers because there are 8 females that are teaching NS in these 4 schools and there are only 4 males. The gender is imbalance but the researcher was not having another option because these numbers of males and females are from the schools that were targeted. So through these numbers it shows that females are most dominating the field of teaching NS using the computers because their number is the double of the male number.

**Table 7**  
**The gender of the NS educators that were interviewed**

Gender	Number	Percentage
Male	4	33%
Female	8	67%

In terms of the age there are 2 participants that have the age that is between 20-25 years and these are the one that has a better understanding of what computer technology is and how to it applied in teaching and learning. There are 3 participants that have an age that is between 25-30 years so these are also the one that still has at least better understanding of

computer in teaching and learning of NS. There are 4 NS educators that have an age that is between 30-35 and these are the NS educators that have a lot of experience in teaching NS using the traditional methods, but they have a less experience in teaching NS using the computers. There are 3 NS educators that have an age that is between 35-40 and these are NS educators that not comfortable about teaching NS using the computers or they are not happy about this transformation.

**Table 8**

**The age of the NS educators those were interviewed**

Age	Number	Percentage
20-25	2	17%
25-30	3	25%
30-35	4	33%
35-40	3	25%

In the tables above what the researcher can state about them is that the NS educators that have the degree's are the one that have a less experience of teaching NS using the traditional methods but they are the one that are capable of teaching NS using the computers because they have the understanding of how to operate and to teach NS using computers. These educators are the one that have a younger age and they show a positive interest of teaching NS using the computers as they stating that it will create a lot of co-operation between them with learners. They also stated that computers in teaching have positive impact. The educators that they have the diploma's some of them are showing the negative attitude of teaching NS using the computers and they state this because they are denying to go and to upgrade themselves and they have a lot of teaching experience of NS using the traditional methods and in terms of the age they are the one that are old in the filed of teaching.

## **5.9 CONCLUSION**

This chapter presents the analysis of the results. The tables were used to analyse the data. This chapter had attempted to answer the critical questions posed in chapter One. This chapter enables the researcher to arrive at the valid conclusion about the findings of this study.

## **CHAPTER 6**

### **INTERPRETATIONS OF THE RESULTS**

#### **6.1 INTRODUCTION**

This section presents the discussion of the results of the data gathered from the respondents to the interviews and observations as outlined in chapter 5.

#### **6.2 Interpretation of the definition of computer technology**

The results showed that there are more respondents that have an understanding of what computer technology and how it is applied in teaching and learning situation. In the findings in chapter 5 I find that 75% has an understanding of what is computer technology because they define computer technology as the tool that is used to transfer information via computers where it installed in programs. Through the critical thinking curriculum model under critical theory in chapter 3 in the educational model where the constructivism state that new knowledge is built on the prior knowledge so it means that this 75% of the NS educators has a prior knowledge from the institutions that they attended and also to those training workshops that they attended that is why they gave the definitions that is related to the definition those authors in chapter 2. Also through the critical theory that the researcher used the educational component which is under the critical thinking curriculum model and it emphasizes that knowledge that acquired should be transferred to demonstrate the highest level of critical thinking. So it means that through this model the NS educators transferred the knowledge that they acquired in the tertiary level that they attended and also in these training workshops that they attended for computer usage in teaching and this knowledge become transferred to the learners.

The definition that given by these participants is linked to other definition in chapter 2 that is literature review where Sampath, Panneersalvain & Santhanam (1994) define computer technology as tool to retrieve information where there is technology in education and technology of education that used to process information. I find that 75%

of the NS educators showed that computer technology has a positive impact in teaching because their definition is more clearly and linked to the definition of the authors that are used in chapter 2. Computer technology has a positive impact in teaching because it develops the knowledge and strategies of the educators in teaching. This supported by chapter 2 where Ellington, Percival and Race (1993) stated that computer technology increases the interpersonal skills, leadership skills, creative thinking and problem solving skills.

### **6.3 Interpretation of the computer impact in teaching NS**

It is a small number or a small percentage of the NS educators that are not having a good idea or understanding of what computer technology is and how it is applied in teaching and learning situation. Through this point it shows these educators has negative attitude on computer usage in teaching because the time for these training workshops is so small and this is supported by the literature review or by chapter 2 where Schank (2001) stated that computer usage in teaching has negative impact as is still new and there must enough time for trainings so that every body will acquire the computer skills thoroughly. Through my theoretical model in chapter 3 under the educational component in Socratic Dialogue where it state that the structure discussion are the key for development where there are questionings and probing for understanding. Through what I stated if these educators can be involved in the discussion where they will question what they don't understand it will be good because it's where they will become cleared of how to teach using the computers.

In the history of South Africa more educators were trained to teach using the traditional methods and these educators have more than 10 years in teaching field. From the results it showed that the NS educators that had an understanding of teaching NS using the computers are those educators that have less than 6 years in the teaching field. In those educators that they have more than 10 years in the teaching field only few percentage that have a better understanding of how to apply computer technology in teaching NS and these are the educators that they upgrade themselves or continued with their studies.

Through the involvement of computers in teaching NS the NS educators can be empowered and become more developed.

#### **6.4 Interpretations for the qualification and experiences**

The 8 NS educators have Diplomas that they obtained in the highest qualification institutions. These educators are the one that they had a problem in teaching NS using the computers yet they have a lot of experience in teaching NS using the traditional methods. Through the theoretical model in chapter 3 under the Assessment component where it stated the assessment must be used to test the learner understands. So through this point by changing of the methods it will lead to the changing way of assessment. The fact that these NS educators are between the ages of 30-40 years old, this means that they have a lot of experience. These NS educators are the one that denying to go further with their studies. These NS educators teaching NS using computers after they receive the training workshops which take 3-4 weeks. These NS educators had the opinion that these training workshops must be longer or they must take about 8-10 weeks so that at the end they will have a clear understanding. These NS educators feels that the chances for promotion to them will be limited because they are computer illiterate yet now in most working area the computer skills are needed. These NS educators that are not computer literate had not enough skills for teaching NS using the computers than those that computer literate.

#### **6.5 Interpretations for positive impact of computer technology in teaching NS**

These NS educators that are computer literate emphasize the importance of teaching using computer and for the time consuming. They stated that because it will broaden their minds as well with the learner's minds in terms of the computer skills. This ties up with the mission statement of the schools as to make the education to be more meaningful and relevant to all stakeholders. This is done by linking the schools with the other departments like the department of Science and technology as well with the other industries that are mostly using the computers. Most NS educators that were interviewed feel that the usage of teaching NS using computers will widened the chances for the

employment for the learners and also to them who are well trained about the computer skills.

### **6.6 Interpretations concerned with NS educators that are computer literate**

The NS educators are trained in the tertiary institutions to use computers in teaching NS become more exposed in doing the activities that are done by using the computers in schools than those who were receive the training workshops or those that are computer illiterate. They are of an opinions that the new NS educators that undergone their studies in tertiary levels always bring the expected and relevant teaching skills through computers. The NS educators that receive these training workshops as they never did any technology course feel that the period of 3-4 weeks is not enough for them to attend these training workshops and they prefer at least a period of 8-10 weeks.

Regarding to the performance at work, where these NS educators are full-time employed most of those that have an understanding of how to teach using computers perform better during the teaching and learning process than those who have not better understanding. This is due to the exposure that they receive in the tertiary institutions that they attended. The most NS educators that have an understanding of teaching NS using computers are strongly agree that the involvement of computers in teaching will create more jobs for the learners after they pass matric as they will be computer literate. This is because NS educators who undergone in the universities possess some relevant expertise gained during their studies. These NS educators stand a better chance during employment due to the computer skills they received. The different tasks/duties performed by these NS educators during their teaching using computers were regarded as being performed satisfactorily.

### **6.7 Interpretations about training workshops for these NS educators**

There is a significant relationship between these training workshops that these NS educators attended with what they done in the universities during their trainings. It is

ascertained that both the universities trainings and workshop trainings are programmed for training these NS educators. The different is that both of them are conducted by the different people. For example the university trainings are conducted by the lectures while these NS educators were the students, where as the training workshops are conducted for these NS educators that are computer illiterate. Both these training programmes are not conducted at the same place. These training programmes are supervised by the experienced people and both of them geared to improve the computer skills and competencies of the individuals.

## **6.8 CONCLUSION**

This chapter presented the interpretation of the results obtained during the data analysis. The tables were used to analyse the data. Furthermore the results were interpreted according to the analysis of each table. The chapter has attempted to answer the critical question posed in chapter 1. All these interpretations have implications for the recommendations regarding the impact of computer technology in teaching NS in grade 8 classes. This chapter enables the researcher to arrive at the valid conclusions about the findings of the research.

## **CHAPTER 7**

### **RECOMMENDATIONS AND CONCLUSION**

#### **7.1 INTRODUCTION**

The purpose of this study was to investigate the impact of computer technology in teaching NS in grade 8 classes. Based on the findings of the study the following recommendations and conclusion have emanated.

#### **7.2 RECOMMENDATIONS**

After a careful analysis of the data the findings lead the researcher to have these following recommendations.

#### **7.3 RECOMMENDATIONS TO THE NS EDUCATORS**

It is highly recommended that these NS educators that are computer illiterate should attend more training workshops to get more computer skills and they should also upgrade their-selves. This is because these training workshops that they are provided with them might give them the opportunity to apply their theoretical knowledge in the practical situation using computers.

It shows that the NS educators that are computer literate find that their teaching become more meaningful because they related the computer skills that they learnt from tertiary institutions with what they are doing in the teaching situation. The NS educators that computer literate should develop a better human relation with those that are computer illiterate. The NS educators that are computer illiterate must upgrade themselves with computer skills with the aim of building their self-esteem, motivation and self confidence.

#### **7.4 RECOMMENDATION TO THE SCHOOLS**

The schools where these NS educators are employed should support these NS educators that are computer illiterate. Therefore it is recommended that schools should make sure that these NS educators that are computer illiterate are upgrading and developing the computer skills. The schools should make sure that after these NS educators attend the training workshops should apply these computer skills in teaching NS. It is recommended that the department of education and schools should assess the suitability NS educators in their recruitment so that they will never spend a lot of money in developing them.

This will strengthen the relationship between the department of education, universities and schools leading to improve the career of the NS educators so as they will contribute to the curriculum design. It is also highly recommended that the schools must be involved in the national curriculum design and planning for new changes so as to maintain the quality of NS educators that they will produce.

#### **7.5 RECOMMENDATION TO THE TERTIARY INSTITUTION**

It is recommended that tertiary institutions should keep up their relationship with the schools and also with the department of education in developing educators with computer skills for this curriculum. The idea of involving the universities and schools in developing this new curriculum is a positive way of linking education to technology and to the other departments. It is recommended that the tertiary institutions must make sure that the students that are doing education must do the technology courses so that they will be able to acquire the computer skills. This is viewed as to uplift the standard of education in our country because everyone will benefit from these computer skills and it will make the NS educators to be able to compete with the NS educators in other countries.

## **7.6 RECOMMENDATIONS TO THE DEPARTMENT OF EDUCATION**

It is recommended that the training workshops that are provided to these NS educators that are computer illiterate should be increase to 8-10 weeks not 3-4 weeks only. This will make these NS educators to become clearer and they will be more expose to the NS activities that are done using computers.

It is recommended that the department of education should do the follow up after these NS educators attended the training workshops. This is due that they should see that are they applying these computer skills in their teaching and learning. The researcher says this because these NS educators might not do well what they trained for or not deliver skills properly in their teaching and learning situation. I also recommend that the department of education must select a person that will observe these NS educators after they attended the training that do these computers skills are applied in a good manner.

It is highly recommended that the department of education should put more emphasis to the tertiary institutions that students that are doing education should have the computer skills so that these NS educators will able to acquire. The department of education should make sure that they assess these NS educators after they offered them with the training workshop so as they will see the loopholes of these training workshops that they offered these NS educators. The department of education must emphasize that these NS educators must work together with the other NS educators of the different schools so as to help each other.

## **7.7 CONCLUSION**

Based on the literature review and findings some conclusions were obtained. It had been concluded that there are similarities and differences in the ideas based to the impact of teaching NS using computers.

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# **APPENDICES**

# A 1

LETTER REQUESTING PERMISSION TO CONDUCT THE INTERVIEWS AND  
OBSERAVTIONS.

Private Bag x 842  
Matatiele  
4730

To : Principal of the schools  
From : University of Kwa- Zulu Natal  
Date : 11 August 2005  
Subject : To conduct the interviews and observations

I hereby request the permission to conduct the interviews and the observations to your school in this year 2005. The topic of this study is that: **Teaching Natural Science (NS) using computers: A case study of grade 8 educators in the Umzinto district.**

This study is aiming to investigate what impact computer technology had in teaching Natural Science in your school. This study looks the impact of computer technology in this new curriculum and also the views of the NS educators. It is also to look how it impacts the teaching methods, skills and the teaching and learning outcomes in Natural Science.

I'm P.K. Matolo at the University of Kwa-Zulu Natal in the Edgewood Campus and my contact address is P.O. Box 231, Ndwedwe, 4342 and my contact number is 0724599118. I obtained the following qualifications: Bachelor of Education undergraduate in 2003 in Westville University, Bachelor of Education Honours in 2004 in University of Kwa-Zulu Natal and at the present moment I'm doing the dissertation for Masters Degree in educational technology. The other person that you can contact for further information is my supervisor S.B. Khoza and his office number is 031 260 7595.

This project was identifies by targeting them schools that was using computers for teaching in Umzinto area and also schools that were offered the computers by the Dinaledi project. I also identified this project because the time I identified the tittle of this project I was a temporary educator at Umzinto area.

The explanation for the participation that agree to participate to this study is that they are allowed to inform the researcher if there is information that they are not happy about it to be published. I will also explain that if they want to raise a question or an idea they are allowed. As I want to conduct this study I will also explain to them that there will be no biases after the data collection because I will bring back the transcriptions so that they will that the information that is written down is what they gave in the interviews.

The task that the interview will undergo will be that the NS educators will go to be interview once and observe once a week in each school. The interviews will be conducted at their schools. The interviewees will be allowed to postpone the interview dates if they can or if they have a serious problem and they must report before the due date. There are four schools that are targeted in this study so I will take a month for data collection where I will take one week in each school.

The benefits for this study is that after this study is completed will I will go back to these schools to do the recommendations to what they need to be supported and developed. There will be no payments or reimbursements of financial expenses because it will be like a bribe so that they will impress me with information. To what I will record the information will be kept confidentially so that it will never reach to the hands of the third person.

The data will be disposed to the libraries and to the other teaching centres as well in other education centres. The data will be disposed when this study is through and when it from the external examination as a thesis. The data that will collected will be confidentially between the researcher and with the participants so that it will never reach to the third person. The data will be confidentially so that when they receive the transcripts they can take out an information that they want to take out before publication or analysed.

If the participant does not to participate it will never be forced or victimised because it is their choice and their feeling to participate or not to participate. The participants are allowed to withdraw the information they are not happy to be published or the

information they will know that it will show their weaknesses into the public. The participants are also allowed to withdraw if she/he feel not want to continue to participate in the study.

DECLARATION

I.....(Full names of participants) hereby to confirm that I understand the contents of this letter and the nature of the research project and I consent participating in the research.

I understand that I am at liberty to withdraw from the project at any time should I so desire.

Signature of Participant

Date

.....

# A 2

MISSION STATEMENT FOR THE DEPARTMENT OF COMMUNICATION AND  
TECHNOLOGY.

DEPARTMENT OF COMMUNICATION AND TECHNOLOGY MISSION  
STATEMENT.

**(Draft Revised National Curriculum Statement (RNCS) - Department of education  
2001)**

The department of communication and technology together with the Department of education aims to meet the educator's needs by providing a series of programmes of the highest standards of excellence.

To provide educators with the wide background knowledge of technology with an aim of developing the good understanding of technology skills in teaching, motivation and development.

To introduce educators to the computer systems is to develop their teaching knowledge and understanding of these matters in such a way that they will be able to take up appointments on completion of their course.

To encourage to be vocation-oriented and strive for the ambition to succeed in their teaching profession.

# A 3

NATIONAL EDUCATION POLICY AND GIUDELINES

## NATIONAL EDUCATION POLICY AND GUIDELINES

**(White paper, 1997- Education and training in South Africa, Cape Town, 15 March 1997)**

### 1. INTRODUCTION

Department of education stated that technology in schools must be compulsory to educators especially those they teach in General Education and Training GET phase and it takes place as follows in the department of education.

- Placement of the new educators in schools to do the observations should do the Observations where they observe how the well experienced educators teach and how the technology skills are applied in teaching and learning. These new educators should assist for a period of four weeks.
- Schools must make it sure that new educators acquired the skills that are needed And that will able to develop them.

To give the new educators the ability to apply theoretical knowledge in an actual work situation and the opportunity to acquire essential teaching skills and as result to enhance their self-confidence.

### 2. Mission Statement

The purpose of experiential teaching is to ensure that the new educators can function as an active member of the educators team where reinforcing the theoretical concepts encountered in the academic environment with applied practice. The experiential teaching promotes the application of knowledge, the developments of skills and the formation of a professional attitude towards the teaching field.

### 3. Aim of experiential training

- To give new educators exposure to teaching field where they applied the theory into practice.
- To give the new educators the opportunity to observe the teaching procedures and skills.
- To give new educators the opportunity to acquire the experience.

#### 4. Procedure

The new educators must be firstly place in the classes where they will observe the teaching procedures for the first 4 weeks.

The educators place in the schools where they will be trained how to teach and acquired the teaching skills.

The educators place in the schools where they will control the classes where they will apply the teaching skills until the end of the year.

A 4

INTERVIEW SCHEDULES AND OBSERVATION  
SCHEDULES

## INTERVIEW SCHEDULE

**CRITICAL QUESTION 1: What computer technology do educators use in teaching NS?**

**Semi-structured interview questions**

**Critical thinking curriculum model: Educational Component: Constructivism, Socratic Dialogue and critical thinking**

- What do you understand about the term computer technology?
- Does your school have the computers?
- If yes, how many computers you have?
- If no, why you don't have computers?
- Do your school try the means to get the computers?
- If yes, where?
- If no, why?

### **Technology component**

- ❖ Did you use these computers for teaching NS?
- ❖ If yes, how do you use them?
- ❖ If no, why you are not using them?
- ❖ How often do you use the computers?
  - ❖ Do you have any problems of teaching using the computers?
- ❖ If yes, what are those problems?
- ❖ If no why you have no face with these problems?
- ❖ How do you overcome these problems?

### **Assessment component**

- How are the outcomes of teaching NS using the computers?
- How are the performance and progress of the educators that are teaching NS using the computers?

### **Community component**

- Is the project that offered your school with computers knows that you are not using them?
- If yes, what they said?
- If no, why?
- If the project can know that you are not using these computers what it will do?
- If you are using computers for teaching, do you use them to teach NS?
- If yes, what impact it has on teaching NS using computers?

**Critical Question 2: What impact does computer technology have on educators that are teaching Natural Science?**

**Semi-structure interviews will be used in this critical question.**

### **Critical thinking curriculum model-Educational component**

- Does computer technology have an impact on teaching NS?
- If yes, what type of impact?
- If no, why?
- Do you use the computers for assessment?
- If yes, how?
- If no, why?

### **Critical thinking curriculum model-Assessment component**

- Why do you use to teach the Natural Science (NS)?
- What is your point of view about teaching using the computers?
- Do the computers affect the teaching strategies that you use in teaching NS?
- If yes, how?
- If no, why?

### **Critical thinking curriculum model-Community Component**

- Do computers influence the progression of you teaching NS?
- Do computers have challenges in teaching the NS?  
If yes, what are those challenges?  
How you overcome those challenges?
- If no, why there are no challenges?
- Do you receive any training workshops from the project for teaching using the computers?
- If no, why?
- If yes, when and how were those trainings?

OBSERVATION SCHEDULE

Researcher's Name.....

Date.....

Name of the school.....

Teacher's Name.....

Duration of the lesson.....

Grade.....

**Critical question 3: How do educators use the computer technology in teaching NS?**

**The observations used for critical question.**

**Use of computers for teaching NS**

**Critical thinking curriculum model: Assessment component**

1. Do educators and learners use computers?

	Yes	No
Educator		
Learners		

2. If the learners use computers, are they using as group or individual?

	Yes	No
Individuals		
Groups		

3. When computers are used?

	Yes	No
Introducing the lesson		
During the lesson		
End of the lesson		

**Critical thinking curriculum model: Educational component-Co-operation relationships**

4. How computers are use to teach NS?

	Yes	No
To introduce the NS lesson		
To form a link in the lesson		
To develop an argument		
To explain the Natural Science concept		
To consolidate what is learnt		
To end the lesson		
For the NS projects		
For the assessments		

**Critical thinking curriculum model: Critical thinking**

5. The competency

	Degree of competency		
How is the educators competency in teaching using computers	Poor	Good	Excellent
How is the Educators confidence in teaching using computers	Poor	Good	Excellent

**Critical thinking curriculum model: Community component**

6. Classroom arrangement

Are learners seated in groups?	Yes	No
Is there enough space to move	Yes	No

7. Purpose of the lesson

1. Are the teaching outcomes clearly achieved by educators teaching using computers?	Yes	No
2. Are the class activities are relevant to teaching outcomes		

8. How the physical settings have an impact on educators that are teaching using computers?

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9. How NS educators become challenged when they teach NS using the computers?

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