

**The use of computer-supported cooperative learning for further education
and training (FET) band learners.**

by

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OPSOMMING

DIE INTERGRASIE VAN REKENAAR-ONDERSTEUNDE SAAMHORENDE LEER IN GESELEKTEERDE SKOLE VIR VERDERE ONDERWYS EN OPLEIDING LEERLINGE.

Dit is nie alleenlik rekenaar-ondersteunde saamhorende leer (ROSL) wat voorgestel word as potensiële hulp met die verbetering vir die verdere onderwys en opleiding (VOO) nie. Dit is belangriker om op te let op hoe dit geïntegreer word met die huidige skoolkurrikulum. Integrasie word beskryf as die manier waarop leer gelei word. Om hierdie integrasie doeltreffend te laat plaasvind, moet 'n vrugtevolle milieu geskep word waarin ROSL kan plaasvind. Hierdie tipe opleiding konsentreer ook daarop om die student as geheel te ontwikkel vir die toekoms, met die oog op werk, eerder as wat dit sou plaasvind in die tradisionele klasatmosfeer.

Hierdie studie ondersoek die integrasie van ROSL as hulpbron tot 'n effektiewe leeratmosfeer in die uitgesoekte sekondêre skole in die Brits ongewing. Deur middel van die studie word hindemisse geïdentifiseer wat deur die navorser ervaar is.

Daar was hoofsaaklik gebruik gemaak van 'n kwalitatiewe navorsing wat onderhoude, waarneming en gevallestudies insluit.

Die bevindinge van die empiriese ondersoek oor hoe ROSL geïntegreer is, het 'n aantal tekortkominge uitgewys. Die ernstige tekortkoming kan toegeskryf word aan 'n tekort aan menslike- en materiële hulpbronne.

Die bevindinge van die gevallestudie, onderhoude en waarnemings word ingespan om 'n teoretiese basis te skep. Dit word verder gebruik om voorstelle aan die hand te doen ten opsigte van die integrasie van rekenaar-ondersteunde saamhorende leer in die onderwys te verbeter in die verdere onderwys en opleiding in die Brits ongewing in die Noorwes Provinsie.

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LIST OF ABBREVIATIONS

- AV – Audiovisual
- ACOT – Apple Classroom of Tomorrow
- CAI – Computer-aided instruction
- CBE – Computer-based education
- CCL – Computer cooperative learning
- CL – Cooperative learning
- CSL – Computer-supported learning
- CSCL – Computer-supported cooperative learning
- FET – Further education and training
- ISTE – International society of technology in education
- IT – Information technology
- MIH – Make it happen
- OBE – Outcomes-based education
- REQV – Recognised educational qualification value
- ROSL – Rekenaarondersteunde saamhorende leer
- SAQA – South African qualification authority
- SGB – School governing body
- VOO – Verdere onderwys en opleiding

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CHAPTER 1

BACKGROUND

1.1 INTRODUCTION

After three decades of implementation of educational technology, the particular use of computers in education is now beginning to have a significant impact on policy-making around the world (Selwyn, 2000:94). Over the last decade a host of countries have made considerable policy commitment, to the development of educational technology infrastructures. For instance, the Clinton administration used \$2 billion for “Technology Literacy Challenge” and \$2.25 billion “E-Rate” initiative in the USA. The UK used 1 billion pounds on “National Grid for Learning; Germany spent DM160 million on “Schulen ans Netz” and Singapore used S\$2 billion was used for “Educational Masterplan for ICT”. These governments’ commitment does not include institutional efforts (Benting, 1994:47). There is overwhelming awareness of the great potential in the utilisation on computers to promote development and alleviate some of the problems in the education system, even in the developing countries (Gardner, 1994:1). It appears that South Africa has not yet come up with a comprehensive approach to computer integration in education.

This study is structured as follows: firstly, the problem statement is presented and justified, secondly, the aim and objectives of the study are outlined, thirdly, the research design is explained in brief, lastly, the plan of the study as well as the summary are used as the concluding part of the chapter.

1.2 CONTEXT AND RATIONALE

There are several national and international organisations that support education and educators in the use of technology. The leading organisation is the International Society for Technology in Education (ISTE), which promotes computer-supported learning (Shelly, Cashman, Gunter & Gunter, 2002:1.18). Initiatives taken by countries such as UK, USA and Germany in promoting educational technology have been discussed in the introductory

paragraph. South Africa has not yet embarked on a national programme on technology education in all provinces, particularly computer-supported education in the FET band.

An increasing number of secondary schools in the Brits district of the North West Province of South Africa are securing computers from different companies with an interest in education. On the other hand not much has been done to develop educators in the effective use of the tools, especially in the classroom. The following researchers emphatically stated that computer-supported cooperative learning (CSCL), if correctly applied, would have a positive effect on learners' achievement (Benting, 1994:68; Davids, 1995:62; Kennedy, 1995:6). CSCL can be of great help in accomplishing the eight learning areas of outcomes-based education, as identified and adopted by the South African Qualification Authority (SAQA).

It had been observed that new technologies are usually simply added to other topics in schools, not really integrated (Cornu, 1996:3). The technologies are not widely used, as it would be expected. Computer literacy and computer skills are treated as new subjects which are mostly added to other topics or subjects in schools, just like one other subject that can be introduced, and be added to the school curriculum; a computer room is also added to the classrooms in schools; time for new technologies is added to the learners' time-table; a chapter about the use of new technologies is added to the school books; computer activities are added to other activities in the classroom. According to Cornu (1996:3), this approach is time consuming and too demanding of the limited time for educators to attend to other matters. The scenario outlined in this paragraph is typical of what pertains to most secondary schools, especially with computer facilities in the Brits district.

There is extensive under-utilisation of equipment and failure of computer-based information systems projects in developing countries (Kennedy, 1995:141). Availability of computers in South African schools is still a problem. In the Brits district, out of thirty-six secondary schools, only four have computer labs/classes. Asmal (1999:3) argues that attention must be focussed on the use of technology in schools because of its impact on students' performance. The current emphasis is on ensuring that technology is used effectively to promote student achievement and success as well as providing new opportunities for learners (Johnston, 2001:1). The gap identified by the minister, refers to the poor implementation of technology, particularly computers in education. Kennedy (1995:142) mentioned that the real limitations

in South African education are not in the technology itself, but in its applications on the ground. The bottom line is clear: technology applied well, can enhance and reinvigorate education, making schools richer and more exciting interactive communities (Asmal, 1999:4; Pieters, 2001:2).

New technology should not just be added to the curriculum, like another subject, which the educator has to face. Instead, it must be integrated into teaching and learning (Cornu, 1996:2). He defined integration as combining parts in a whole that is designing integrated curricula. This approach would prevent using technology as a separate tool from learning. Naidu, (2001:9) identified uses of computer as an important tool, that can determine the success or failure of computer-supported cooperative learning (CSCL). To ensure that the use of technology as a tool to support learning, computer-supported cooperative learning must be correctly implemented; educators should be subjected to training, which would be conducted in a face-to-face situation in the project schools, to ensure effective integration. In the process of integration, the teacher is identified as an agent of change, who plays a pivotal role in the teaching and learning process (Cornu, 1996:4; Asmal, 1999:4).

Having met few secondary school teachers from the Brits district, whose schools have been using computers for a number of years, I came to realize that they don't enjoy maximum benefit of the technology. Asmal (1999:3) said, "We can put technology in classrooms but without committed, trained teachers, this technology will be of no value." Teachers should regard computers as being valuable as artists regard palettes or accountants their spreadsheets (Beals, 1991:73).

As schools obtain more technology, the question about how to use computers effectively rarely precedes the question of where to locate them: in the classroom or in the computer lab (Culbertson, 1999:1). The two questions are essential to each other, even though most secondary schools in Brits district would turn to be more concerned about safety than skills. This area is mainly rural and poverty stricken, with high rate of theft and vandalism. In an ideal school the purpose for which the computer have been acquired should determine the location. For schools, which intend to use drill and practice software, which aims at teaching mostly computer-based skills and for those without knowledgeable teachers to use them, the lab may be the best place. For teachers who want to take advantage of computer as a learning tool, who want to emphasize group work and project-based learning, who want to change to

fully integrated technology, then the computers would be more suited in the classroom setting. A situation where technology is made available to the learners in their respective classrooms is still not realised in most secondary schools in Brits District.

These schools have not benefited much from the introduction of technology. They have not realized that most of the problems faced by educators could be solved with the assistance of a computer (Forcier, 1999:25). If the computer is to be an effective tool in increasing productivity, fundamental questions to be answered by the teachers are: “When do I use a computer?” “Will using a computer save time?” “Will it allow me to perform tasks that might otherwise be beyond my skills?” and “Can I get better, more complete and more accurate information by using a computer or will it just complicate my life?” An educator, who is knowledgeable on computer-assisted learning, would be able to answer these questions correctly, for the benefit of effective learning. Using computers in education depends upon the effective use of software that can increase productivity (Forcier, 1999:25). Computer users need to be thoroughly familiar with the process. It is not only computer-supported cooperative learning, which can effect the necessary changes in learning, but also the way it is integrated into the core-curriculum.

Learners and educators need to be exposed to the benefits of computer-supported cooperative learning (CSCL) so that they can keep abreast of the global technological developments in education. They should come to understand that with the introduction of CSCL, technology will not replace the teacher in the classroom but adds interest and involvement. A computer cannot transfer the smile of a teacher when a student finally gets the concept or provide a pat on the back for a job well done. A computer cannot console a child who needs support or give advice with the full knowledge of a child’s individual circumstances and family situation (Starr, 2000:1). A computer will obviously not be able to provide a human touch. Pieters (2001:1) stated that the role of the teacher as “sage on stage” is replaced by acting as facilitator/academic coach, who engages and empowers students to play a more constructive role in their learning and accomplish their performance tasks as expected by OBE.

Integration of CSCL has been researched since the late 1970’s and 1980’s in different countries, but these researches had not been focused on the North West Province, particularly the further education and training band in the Brits district. Integration takes place within a particular setting or environment; therefore it would be influenced by factors like educators

and learners' readiness, socio-economic background, relation with colleagues, curriculum development. All these factors would affect different communities in different ways. I therefore strongly feel that the schools in Brits district should be advised on how improved the situation in their area.

1.3 PROBLEM STATEMENT

This study aims to generate a set of guidelines that can be used when computers are used to facilitate computer-supported cooperative learning. The guidelines will be generated after an investigation into the concept CSCL. The introduction of OBE into schools in SA necessitates the use of cooperative learning strategies. The computer can be used very effectively in facilitating cooperative learning. However, it appears that a lack of expertise and knowledge about how to use the computer as a cooperative learning tool exist. This study will attempt to address this need by investigating the nature and characteristics of CSCL, and matching these with the contextualised needs of the selected schools in further education and training band (FET). My preliminary investigations suggested that there might be a gap between acquisition of computers and their effective utilization. The cause of this problem may be attributed to the addition of computers as another subject, instead of integrating it with the existing curriculum.

The main problem addressed is:

How can computer-supported cooperative learning be integrated into the learning process in selected schools in Further Education and Training band?

The subsidiary questions are:

- How can computers be integrated into the FET curriculum?
- What is computer-supported cooperative learning?
- To what extent has selected schools integrated computer-supported cooperative learning into the learning process?

- What are the shortcomings experienced by selected secondary schools?
- How can these schools improve their integration strategies?

1.4 AIMS AND OBJECTIVES

The study aims to generate recommendations that can be used when computers are used to facilitate computer-supported cooperative learning. An investigation into the concept computer-supported cooperative learning was conducted. Objectives therefore are:

- To determine how computers can be integrated into FET curriculum.
- To determine what computer-supported cooperative learning is.
- To determine how far has computer-supported cooperative learning been integrated into learning.
- To identify the shortcomings experienced in integration process.
- To suggest strategies for the integration of computer supported cooperative learning into similar schools.

1.5 RESEARCH DESIGN

The next section presents an abbreviated description of the procedures for collection and analysis of data. A list of measures or instruments to be used in gathering data is included.

1.5.1 Research paradigm

In this study a qualitative research method was used. This method usually takes place in natural situations, which exhibit control, behaviours and settings. Qualitative research emphasises understanding, verbal narratives and flexible designs (Ary,

Jacobs, & Razavieh, 1990:217). Through this method I was in a position to observe natural situations at selected schools and interacted with the school management, relevant educators and learners.

1.5.2 Research method

Case-study research method was used to enable the researcher to learn from practice, through observations and interviews. In the process, a better understanding of the problem under investigation was gained, enabling the researcher to draw conclusions in an interpretive and inductive way (Grobler, 1995:45).

1.5.3 Data collection techniques

- **Observation**

The researcher conducted observations in classrooms and the computer labs of the selected schools. Secondary schools with computer facilities were visited.

- **Interviews**

Both semi-structured and informal interviews were arranged. In the case of structure interview, an hour-long appointment was secured with the interviewee. Either the principal or the teacher in charge of computer-supported learning, or both were interviewed. The purpose was to gather more information on the implementation of CSCL.

- **Document studies**

School records, like computer/technology policy, grades, test scores, integration procedure, were of great help to the researcher. Getting these documents directly from the school records saved time. In addition, they were more accurate than asking students and teachers.

1.5.4 Data analysis

Tesch's (1990) approach of open coding was applied. According to her, data analysis would be conducted simultaneously with data collection, data interpretation and narrative reporting

and writing. Every school's data would be analysed individually and with other related information. Later data was categorized and interpreted, to find commonality and differences among the approaches used by different schools in how they use CSCL. A plan for representing the information in matrices comprised of tabular categories like role ordering.

1.6 PLAN OF STUDY

The investigation is divided into five chapters. Chapter one, as already introduced, consists mainly of introduction of the research study and how it will be conducted, in order to achieve its goals.

In chapter 2, literature will be reviewed to acquaint the researcher with relevant available information on the research topic.

In chapter 3, the researcher will describe the appropriate research approach, which will yield results.

In chapter 4, data collected will be reported and analysed, according to the research design, discussed in the previous chapter.

In chapter 5, recommendations will be discussed from which a final conclusion will be drawn.

1.7 SUMMARY

In this introductory chapter, a brief orientation to the study is provided, stating clearly, the problem to be investigated. The major focus of the study is to find out ways in which further education and training, learners in selected schools in the Brits District of the North West Province had progressed in the integration of CSCL into their core-curricular. The approaches used, as well as the implementation process would determine the success or failure of CSCL.

“Technology, applied well, can enhance and reinvigorate education, making schools richer and more exciting interactive communities of learning for students and teachers alike” (Asmal, 1999:4).



CHAPTER 2

COMPUTER-SUPPORTED COOPERATIVE LEARNING (CSCL)

2.1 INTRODUCTION

“While the broad goal of education is to educate and socialize learners into becoming functioning, effective adults in society, the pre-occupation with competition and individual achievement in schools often results in a failure to teach the necessary cooperative skills required to attain this goal” (Kennedy 1994:139). In the 1970’s, computer-assisted learning was introduced to maximize individualization. In the 1990’s a new approach of collective responsibility was introduced. The last decade has witnessed a shift in educational thinking from individualization and competition to cooperative learning.

The growing interest in cooperative learning strategies has become associated with computers as facilitators of learning, hence computer-supported cooperative learning (CSCL). CSCL is more than just a method to increase learners’ access to computers. It represents an innovative approach to education and training with implications from changing existing instructional and traditional approaches to learning. It combines cooperative learning and interactive information technologies.

This chapter explores concepts like outcomes-based education (OBE), information technology (IT) in education, cooperative learning (CL), computer supported learning (CSL) and computer-supported cooperative learning (CSCL). With the understanding of all these concept, the researcher will be able to discuss computer education in relation to OBE.

2.2 OUTCOMES-BASED EDUCATION (OBE)

Outcomes-based education is a system of education that focuses on the ultimate performance abilities, which learners are expected to be able to do successfully, once they have finished their studies. According to Spady & Schlebusch (1999:38), these abilities are called “outcomes”. The term “outcomes-based” suggests that everything that happens in an OBE system is based on what its outcomes are. Outcomes-based education is therefore education

that is based on a framework of “outcomes”. How is OBE related to IT, CSL and CSCL? The following figure illustrates a possible relationship.

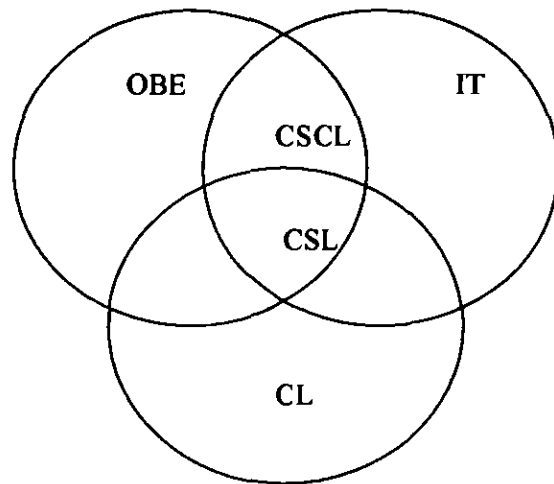


Figure 2.1 A possible relationship between OBE, IT, CSL and CSCL

According to fig.2.1, there is a possible relationship between OBE and CSCL because in both approaches cooperative learning and technology are encouraged.

In order to assess CSCL, it is deemed important to describe the interrelated concepts that may impact on it. In the context of South African schools, it is important that OBE is discussed. Furthermore, it is imperative to outline how computer, can be integrated into a school curriculum, as this may impact on the manifestation of CSCL. In addition, the concept CL and specifically CSCL must be discussed. The principles of OBE can be realised through the implementation of computer-supported cooperative learning (CSCL). Both OBE and CSCL share the concepts of effective usage of technology to enhance learning, cooperative learning, which can be achieved through teamwork, exchange of ideas, sharing common goals and come up with proposed solutions. The emphasis in both OBE and CSCL is shifted from teaching to learning. This study will concentrate on the benefits derived from the integration and implementation of CSCL in learning.

Increasing calls for accountability were one reason for the rapid spread of outcomes-based education in countries such as the United States and the United Kingdom during the 1980's (Killen 1998:1). In South Africa, the move towards outcomes-based education, which started in 1996, has some of the economic accountability features of OBE. Its broader purpose was to assist in the transformation process. The South African government has taken a transformational approach to OBE, with a clear emphasis on critical outcomes that will ensure learners gain the skills, knowledge and values that will allow them to contribute to their own success as well as to the success of their family, community and the nation as a whole (Department of Education, 1997:10).

The South African Qualification Authority (SAQA) adopted eight Learning Areas as the framework for the new South African education system, which are Communication and Language; Culture and Arts; Human and social studies; Physical, mathematics, computer and life sciences; Agriculture and nature conservation; Business, commerce and management sciences; Manufacturing, engineering and technology and lastly Services.

Information Technology can enhance OBE's approach to planning, delivering and evaluating instruction that requires teachers and students to focus their attention and efforts on the desired end results of education, particularly when those end results are expressed in terms of student learning. Within this broad philosophy, there are two basic approaches to OBE. One approach emphasises student mastery of traditional academic outcomes and some cross-discipline outcomes such as the ability to work **cooperatively**. Cooperative learning, endorses the underlying principles of learner participation, critical thinking and group learning.

Information Technology

Cooperative learning

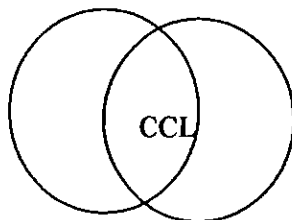


Fig.2.2 Information Technology and cooperative learning

Figure 2.2, indicates the relationship between the two most relevant aspects of OBE which are technology and cooperative learning. CSCL is based on these two concepts.

Contemporary living puts emphasis on a citizen's skills in relation with others. Relationships between the races, the sexes and nations have all become paramount concerns. An even more compelling need to deal with interpersonal, intergroup and intersocietal conflicts is prevalent today (Slavin, 1990:124). Most of the time, students work independently, and they are continually in competition with one another for praise and recognition. Students should learn to work together to achieve common goals. Cooperative learning programmes intends to inculcate positive effects on a wide range of outcomes, including achievements, intergroup relations, attitudes toward academic work and self-esteem. Students learn to share ideas and to accomplish together.

2.3 INFORMATION TECHNOLOGY IN EDUCATION

Information technology (IT) is currently becoming diffused throughout society and little doubt exists that nations are engulfed in the information period. IT is changing the world and the information society concept. Without IT, success in just about any field (farming, manufacturing, banking, and education) has become nearly impossible (Orlikowski, 1994:56). From a South African perspective, the educational field can derive benefit from technology, which however, should not be seen as a panacea. It would be a mistake to suppose that technological intervention simply has a one-sided effect (Grobler, 1995:52). Shelly, et al. (1999:7) gives four various approaches to technology in education as: technology as media, technology as instructional system, technology as vocational training tool and technology as computer-based system. The various approaches are illustrated in figure 2.3

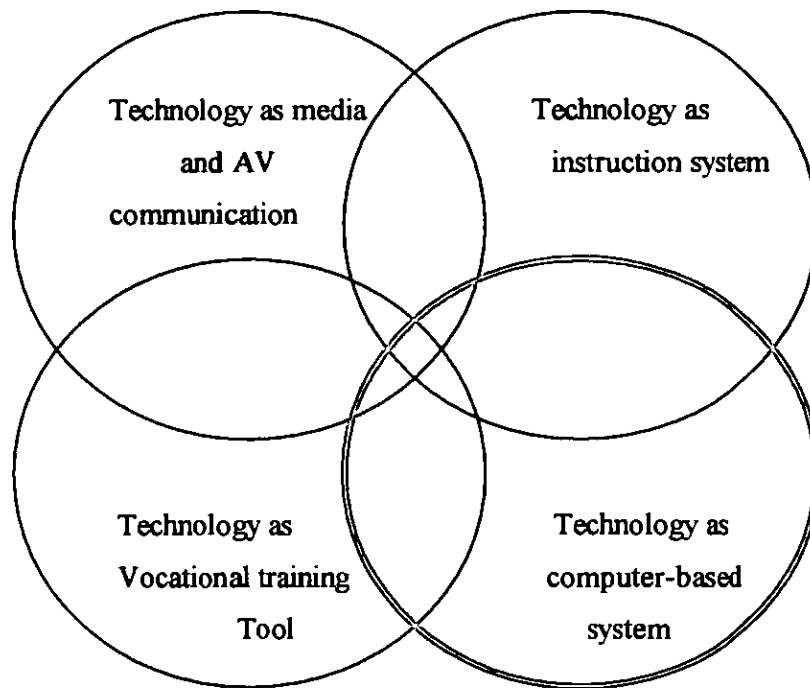


Fig.2.3 Various dimensions of Technology in Education

(Shelly, et al.1999:7)

The relevant approach to this study is the technology as computer-based system. Technology as media and audiovisual communication is used to deliver information that could be used as alternative to lectures and books. Technology as instructional system is used to solve educational problems. Technology as vocational training tool was used to enhance training in specific job skills. Technology as computer-based systems uses computers as the most important component of educational technology and technological resources.

Technology as computer-based system is what the study will be focusing on. Technology can expedite the addressing of educational demands in South Africa, although technology itself cannot achieve anything without human agency. South Africa has to use technology in such a way that it satisfies its unique social and economic needs by addressing the deep-rooted educational problems. An intervention of IT in education and training can be used to address some of the educational and development realities, with a view to eventually achieving educational objectives (Grobler, 1995:52). While the early days of educational computing

were characterized by the belief that the primary benefit of the computer in education was that of individualized learning, research has proved the opposite to be true.

Research, in contrast to popular belief that computers enhance antisocial behaviour, indicates that computers facilitate increased socialization and interaction between learners. Working in small groups can ease the limited number of computers in schools. The computer, when used in collaboration with cooperative learning strategies, not only creates a “richer” learning environment in which more cognitively significant learning experiences are available, but also enables the teacher to overcome many of the obstacles of ordinary cooperative learning (Dockterman, 1991:45).

As assistant classroom manager the computer helps the teacher keep multiple teams of students directed and on-task, by controlling the flow and distribution of information the computer can help enforce a level of cooperation among team members. As a record-keeping device, it can help increase intergroup interactions during the activity and help organize debriefing exercises. The computer can highlight interesting points and conflicts for further examination and discussion.

The introduction of new technology would result in what Norton & Sprague (2001:5) refer to as “dilemma”. They stated that it is easier to put a man on the moon than to reform public schools and that reforming schools is like moving a graveyard. On the other hand, other authors such as Kennedy (1995:121); Culbertson (1999:2); and Starr (2000:4) encourage people to explore, with each new technology. Some see new possibilities and new urgencies. Claims predicting change in teacher practice and student learning begin to dominate the literature in a wave of enthusiasm for the new technology, and efforts are made to bring these technologies and visions to classrooms. It should be accepted that any innovation irrespective of how wonderful it can be, has got its weaknesses. For instance, the following have been identified with the introduction of computers in the learning process:

- Lack of commitment by the school principal and/or teachers to invest the time and effort necessary for effective implementation of computers (Kennedy, 1995:9).

- The inability to integrate computers into the ongoing curriculum. This is not solely the fault of the teacher, but in many cases, teachers are either not trained or only poorly trained to use the system.
- Fear that computers would displace teachers' professional skills, reducing their participation in students' learning and denying them the opportunity to interact with learners effectively. This would result in both parties becoming frustrated when the test scores are not improving. Forgetting that for computers to be effective, technology must become an integral part of instruction and not be viewed as an add on-tool.

The successful use of the computer in the classroom relies on the power of the computer to enhance learning, the quality of the software used and peer group interaction (Norton & Sprague, 2001:3). The computer can enhance learning because it offers a variety of interesting displays, it has realistic graphical abilities, it can provide immediate feedback and can allow pupils to work at their own pace. It is one of the most powerful resources since it has the ability to dynamically integrate text, audio and graphics (Norton & Sprague, 2001:3). The computer can store a tremendous amount of information and can make access to it relatively easy. For computers to be effective in education they need to be incorporated into education.

2.3.1 Integration of computers into education

Computer integration is the combination of all technology parts, such as hardware and software, together with each subject-related area of curriculum to enhance learning (Morrison, Lowther & De Meulle, 1999:15). Technology is used to meet the curriculum standards and learners' outcomes of each lesson. Indicators of integration are synchronous and/or asynchronous communication. Synchronous communication usually occurs face to face, with two or more people through text or files. This can be possible if two or more computers are connected to each other over a network. Asynchronous communication is a delayed communication, and only one person can communicate at a time. It can be one-to-one, one-to-many or many-to-many communication. Other indicators are interaction, group setting, giving help and receiving help, e-learning, internet chat, desktop video, e-mail, file transfer and web page.

The key to successful technology integration is identifying what one is trying to accomplish within the curriculum. Firstly, one has to consider the learning goals and standards to be achieved then identify an appropriate technological tool that will help accomplish them. Consider learning style that individuals learn and how they prefer to receive information. Some learners learn more effectively in groups than individually. Forcier (1999:63) argues that if computer software implements the instruction and learning strategies in an effective and efficient manner, should not this instrument be seen as a teacher productivity tool? He identified three dimensions of computer in education as management, instruction and learning and action research as illustrated in figure 2.4. Instruction and learning is more relevant to the study because it discusses aspects such as computer literacy, computer assisted instruction, computer managed instruction, design of teaching material and construction of knowledge by learners, which are directly related to CSCL.

Integration of computers empowers the individual learner in the new distributed, educational processes. Much learning would be outside the teacher's sphere of influence. The teacher becomes a learning guide or a mentor for the students, cooperating with pupils in a learning experience (Van Weert,1994:17). Integration is part of the teaching and learning process, which starts with determination of intermediate goals and outcome goals. Intermediate goals are the products of processes necessary to achieve outcomes. In one sense, intermediate goals can be described as a "means to an end". Outcome goals reflect the final product or "outcome" desired. For example, one may want to know if access to CSCL will improve student learning. In this case, it would be an intermediate goal and improvement in student learning would be an outcome goal.

The relationship between intermediate goals and outcome goals is not always straightforward. In some cases, intermediate results such as more computers in the classroom or added professional development, work together to enable desired outcomes to occur. In other cases, one intermediate result may influence an outcome by way of another intermediate result, e.g. increased professional development leads to increased integration of technology in the curriculum, which then leads to higher student performance (Norton & Sprague, 2001:4)).

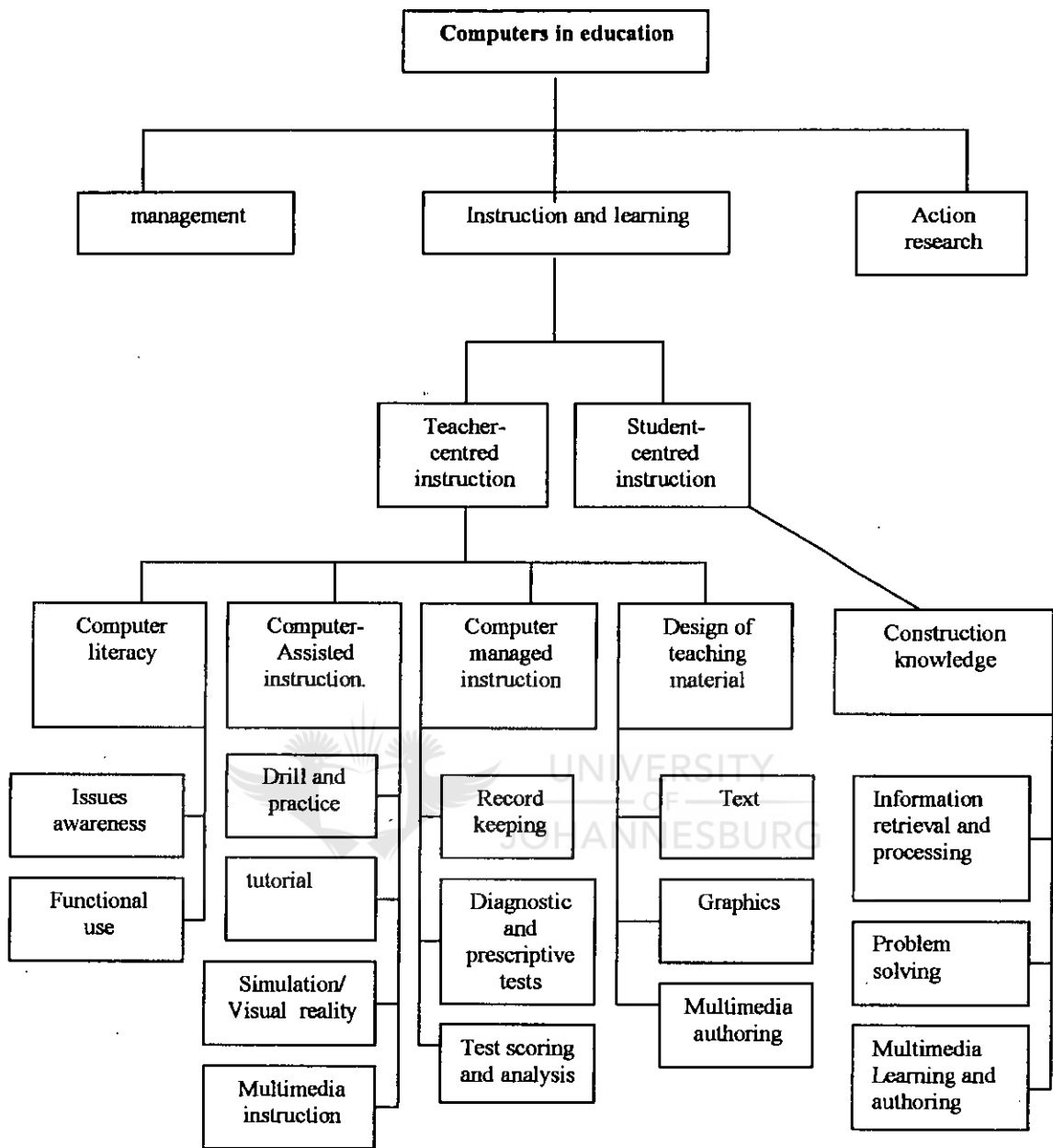


Fig 2.4 Classification of computers in education

(Forcier, 1999:63).

The ultimate goal of many technology programmes is to increase various aspects of student achievement, or educator performance. In this study, the outcome goal is the improvement of

learning, through integration. This may influence achievement positively. The concept of intermediate and outcome goals is illustrated in figure 2.5.

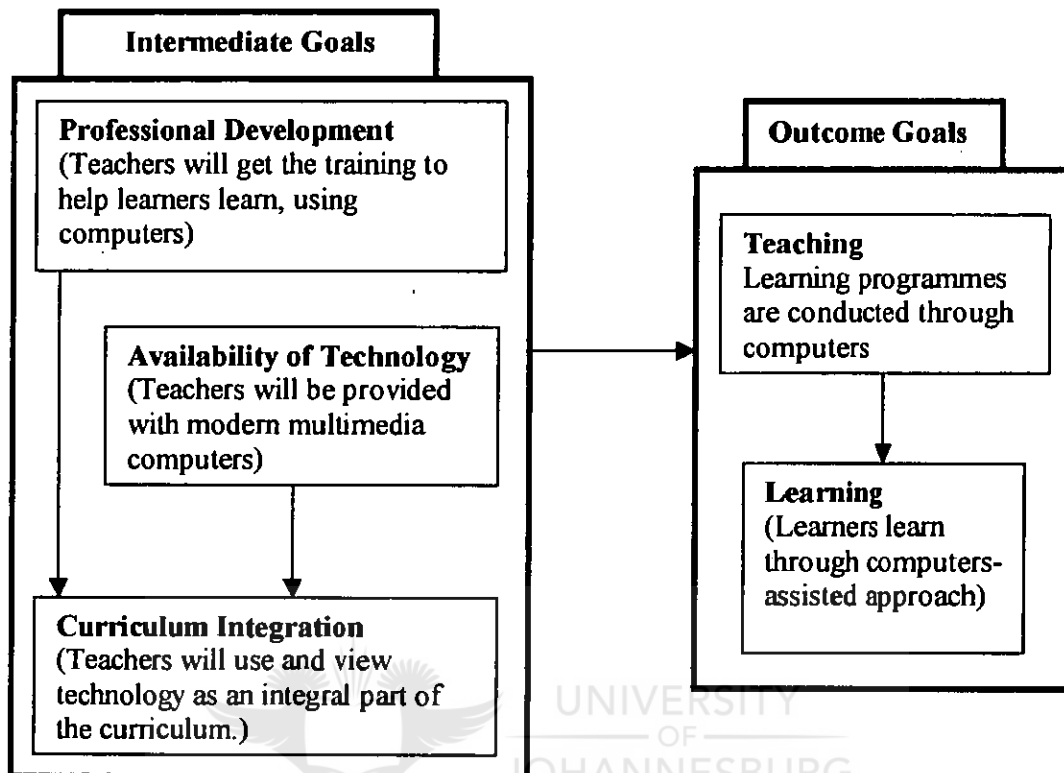


Fig 2.5 Intermediate goals and outcome goals
(Van Weert, 1995:17).

There are many different ways that the intermediate goals and outcome goals could be related, the diagram above outlines one of the possibilities. The relationship could be of great help in the integration process. Figure 2.5 gives only key concepts. Van Weert (1995:17) outlined other factors. According to him, the global change in education will affect many elements of the educational infrastructure such as: administrative practices, funding, teacher training, curriculum development, implementation, management, media, organisational practices, facilities procurement.

2.3.2 Models of the integration of computer-assisted learning

Any model for integrating computer-supported learning at school level should take cognisance of the form of education the school is using, the method of teaching, goals and benefits. Three different models are briefly discussed in this section, namely the Apple Classroom of Tomorrow (ACOT), CAMI Mathematics and Make It Happen (MIH).

- **Apple Classroom of Tomorrow (ACOT)**

The ACOT model aims at providing insights into how technology would affect teaching and learning (Fisher, Dwyer & Yocam 1996:2). This model was tested with a project that involved 650 students and 32 teachers working in technology-rich classrooms in the United States of America. The project documented the course of instructional change in those classrooms from 1985 to 1990 when it began publishing its findings. The model, noted the changes that took place on the students and teachers who had access to relevant technology on daily bases. Parents, students, teachers, administrators and volunteers we involved in the project.

The project produced an evolutionary model of the integration of technology-intensive classrooms divided into five phases, namely Entry, Adoption, Adaptation, Appropriation and Invention (Dwyer, et al. 1991:49). According to this Model, it is only in Appropriation that a student can individualise, use cooperative approach, simulation and monitors his/her pace. The last phase of Invention, is when students become creative and interact.

- **CAMI Mathematics Model**

CAMI Mathematics model is divided into three phases: Knowledge Retention, Knowledge Processing and Knowledge Expansion (Vorster, 1995:45). This model was based on the running of a commercial computerised mathematics school since 1984 and the implementation of software and methodology in mote than 200 schools by 1996. The focus of this model is not on technology as in the ACOT model, but on teachers, hardware, software and examination results. It also emphasised the retention of information.

Phase one does not require computer knowledge. The work done is mainly practice and drill. Phase two requires the student to acquire knowledge on Word processing, Spreadsheet and

database. Phase three, students are required to further expand their computer knowledge. This model is illustrated in Table 2.1

PHASES	USE MADE OF COMPUTER	TYPE OF HARDWARE AND SOFTWARE	ROLE OF TEACHER
1. Knowledge Retention	Cements recently taught subject matter using drill and practice	Needs Mono screen monitor 1MB of RAM one dot-matrix printer networked system drill-and-practice CAMI Mathematics	Needs little involvement supervision and computer knowledge
2. Knowledge Processing	Take existing knowledge and reprocesses it using word processor, databases spreadsheets	Same as above with addition of ink-jet printer suite such as MSWorks for DOS based desktop publisher Testing program such as Study Aid	Needs Planning Preparation Teaching tasks Using existing applications Computer application knowledge
3. Knowledge Expansion	Exposes students to new and unknown topics using CD-ROM Multimedia New technologies	As above plus At least one multimedia computer with CD-ROM in each computer room	Needs Lesson preparation Planning and organizational skills for cooperative learning Technical computer application knowledge

Table 2.1 CAMI Mathematics Model
(Miller, 1997: 12)

The CAMI Mathematics Model focuses mainly on the teacher's capabilities, hardware and software requirements for each phase.

- **Make It Happen! Model**

- The Make It Happen! (MIH) Model focuses on the curriculum and the integration of technology to promote school change by developing a positive attitude towards learning.

The model is illustrated in Table 2.2

<p>Step 1 (1st year)</p>	<p>Theme: Build a strong foundation for innovation</p> <p>Curriculum components</p> <p>Teachers and administrators</p> <ul style="list-style-type: none"> Evaluate school's curriculum goals Begin a process of curriculum revision Select topics which could be studies in an interdisciplinary inquiry based unit which integrates computers Begin to form a shared vision of successful technology integration <p>Teacher development component</p> <p>Teachers</p> <ul style="list-style-type: none"> Learn about software that can enhance inquiry-based learning Evaluate software Receive training with applications suitable for potential use <p>School-based facilitation component</p> <p>Principal</p> <ul style="list-style-type: none"> Identifies participants for the MIH team
<p>Step 2 (1st and 2nd year)</p>	<p>Theme: Initiate with a small group of pioneer teachers</p> <ul style="list-style-type: none"> Work continues as in 1st year MIH team meets regularly to discuss problems, plan and make decisions
<p>Step 3 2nd year</p>	<p>Theme: Expand to whole school</p> <ul style="list-style-type: none"> Pioneer team continues to design, implement and evaluate curriculum units More teams of teachers follow pioneer group's example Pioneer teachers mentor members of expansion teams MIH team changes composition to give representation to expansion team

Table 2.2 Make It Happen! Model

According to the model the school aims to move forward to collaborative planning and teaching that fosters higher-order thinking in adolescents. The goals set in the model (Zorfass, 1991:69) are for:

- Principals and school-based management teams to create a supportive context that facilitates computer integration;
- Interdisciplinary teams of teachers to design, implement and evaluate a curriculum that uses computers to support inquiry-based learning; and

Adolescents to expand their critical thinking abilities, cooperative learning behaviours and positive attitudes towards learning by engaging in the curriculum that would have been developed above.

The three models discussed have different features, which are of relevance to the investigation on CSCL in the Brits district. According to ACOT, teachers appeared to have freedom of teaching material and methodology. Teachers and students adopted technology willingly. The CAMI Mathematics model's strong point is results. With this integration model results are expected to improve. The Make It Happen! Model is good at capacity building, to ensure sustainability and continuity. Any of these models may be used depending on the district or school situation.

2.3.3 The role of the administrators in technology integration.

Teachers have often come under fire for their failure to fully integrate technology into their classrooms (Starr, 2001:1). Until recently, however, very little has been said about the role of school administrators in technology integration. The most effective way school administrators can promote technology use is to themselves be knowledgeable and effective users of technology. Principals play a large role in setting a climate for computer-supported learning. Starr (2001:1) stated that teachers who are undecided, or think that they don't have time to get involved with technology, think twice when they sense a positive attitude on the part of the administration.

The other ways identified by Starr (2001) in which the principal could encourage the use and integration of technology is to:

- Support and encourage teachers who want to go to conferences and participate in staff development.

- E-mail notices and agendas to staff, rather than printing and distributing them.
- Foster technology growth by asking parents to write e-mail addresses on admission forms.
- Attend technology conferences to see what other schools are doing, what other teachers are doing to integrate technology, and what principals are doing to encourage the use of technology in their schools and classrooms.
- Ask that lesson plans be submitted through e-mail or on disk.
- Insist that all teachers create a class Web page.

School administrators can encourage teachers' curiosity about what can be achieved through technology, provide incentives for teachers to attend workshops and conferences, and persuade teachers to use technology in their classrooms. The principal should see to it that the following needs are also provided:

- Opportunities for staff development.
- Sufficient up-to-date workable computer equipment.
- Funds for computer improvements.
- Time and resources for troubleshooting programs and future planning.
- Internet access.

Teachers would be more apt to use technology if administrators felt strongly about technology use for reasons that are based on facts, not merely assumption that they need to copy from other schools. It is not only the utilization of technology that is encouraged by OBE, but also cooperative learning.

2.4 COOPERATIVE LEARNING (CL)

Cooperative learning refers to learning environments that are specifically structured to emphasize peer interaction in the context of cooperative goals rather than the individual or competitive goals of the traditional classroom. The concept of cooperative learning stems from two principle rationale (Light & Mevarech, 1992:59), namely the social and cognitive rationales. Mechanisms, which are not conflict-based, e.g. co-constructive processes and

negotiation of joint action impact positively on students' motivation, self-esteem and cognitive growth. It assists in conflict resolution, due to different opinions and strategies and cognitive development, by producing higher-level restructurings of understanding.

Within the broad philosophy of OBE, a cross-discipline outcome such as the ability to work cooperatively is emphasised (Killen 1998:10). Cooperative learning involves working together to accomplish shared goals that are beneficial to individuals and the group (Adams & Hamm, 1996:3). Students are able to learn together and perform alone within an environment that allows them to actively construct knowledge. In the cooperative classroom communal responsibility and civic engagement are not viewed as optional extras. When everyone is involved, cooperation can become part of the fabric of schooling at every level (Adams & Hamm, 1996:3).

Light, et al. (1992:157) defines cooperative learning as “an organisational structure in which a group of students pursue academic goals through collaborative efforts. Students work together in small groups, draw on each other's strengths, and assist each other in completing the task. This method encourages supportive relationships, good communication skills and higher-level thinking abilities.”

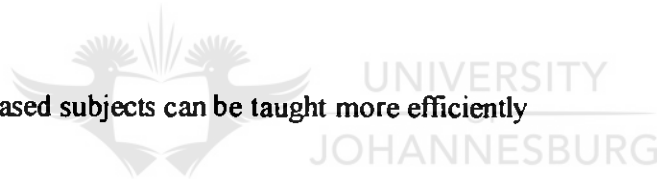


Since the early 1980's the growing interest in cooperative learning strategies in general has become associated with and enhanced by an equally significant interest in computers as facilitators of learning (Norton & Sprague 2001:26). The process of cooperation is often based on a sharing of the responsibility for reaching goals. Coordination is often referred to as one of the main issues in cooperation and is therefore extremely important to a cooperative learning environment. In a cooperative learning environment, learners are encouraged to work together in well-defined groups.

The success of group learning can be traced back to the claim that groups are one of the most important factors in daily lives. For the greater part of the day, people interact in different groups. The effectiveness of our group work also has a direct link to our quality of life. Groups are the basic building blocks of human existence. Therefore, the main purpose of grouping learners is to maximise both the learner's own learning and the learning of the other members of the group.

The incorporation of cooperative strategies into computer-supported learning (CSL) not only enables powerful learning to take place, but also enables the teacher to overcome many of the instructional limitations of computer-assisted individualistic learning, for example:

- The sharing, processing and relating of information and knowledge enhances the chances of the content being retained as something more deeply imbedded in the mind.
- Spontaneous student discussion provides a window for the teacher into how the class is viewing and comprehending what they are learning.
- Interdependent group activities foster the development of leadership and communication skills.
- Heterogeneous groups help to break down social and academic barriers.
- Group psychology can be used to address and modify learning behaviour of individual students.
- Sociologically-based subjects can be taught more efficiently



2.4.1 Essential elements of cooperative learning.

CL and OBE share the elements of interdependence, accountability, skills and teamwork. The learning goal is specifically structured in such a manner that it creates a positive interdependence between the learners. Students perceive that they need each other in order to complete a group task. The physical arrangement of the students in small, heterogeneous groups encourages students to help, share and support each other's learning. Each student is responsible for the success and collaboration of the group and for mastering the assigned task. The students are taught, coached and monitored in the use of cooperative social skills. Students reflect on how well they work as a group and how they can improve their teamwork.

Research done on cooperative learning suggests (Hamm & Adams, 1992; Johnson, 2001) that this approach to learning has, many advantages. Groups of students talking together on a problem or project experience the fun and the sharing of ideas and information. Students

show that classroom interaction with peer causes student, especially those from diverse cultural and linguistic backgrounds, to make significant academic gains, compared with students in traditional settings. Extensive research has shown that students learn more when they are actively engaged in discovery and problem solving. Interaction of learners by themselves can lead to new ideas. Students who work together in mixed ability group are more likely to select mixed racial and ethnic acquaintances and friendships. Team study offers students many chances to use language and improves speaking skills. This is particularly important for second language students. Group approaches to solving problems, combining energies with others and working to get along, are valued skills in the world of work, community and leisure. By actively engaging students in the learning process teachers also make important discoveries about their students' learning.

For the diverse, poorly educated population of South Africa, the above-mentioned advantages can be very motivating. It was also found that cooperative learning improves social relations between racially and culturally diverse students.

CL goes well beyond merely putting groups of children in front of computers. For it to be successful the five essential elements of authentic cooperative learning structures must be present in the learning situation (Johnson, 2001:7).

2.4.2 THE ROLE OF THE TEACHER IN COOPERATIVE LEARNING

The task of the teacher in structuring a cooperative learning environment can be illustrated by the acronym BUILD (Kennedy, 1995:140) as follows, from the first letter of each of the following:

- Build in higher-order thinking for transfer (positive interdependence).

The learning goal is specifically structured in such a manner that it creates a positive interdependence between the learners.

- Unite teams in face-to-face interactions.

The physical arrangement of the students in small, heterogeneous groups encourages students to help, share and support each other's learning.

- Insure individual learning (individual accountability).

Each student is responsible for the success and collaboration of the group and for mastering the assigned task.

- Look over and discuss the interaction (group processing).

Students reflect on how well they work as a group and how they can improve their teamwork.

- Develop social skills of cooperation for life (cooperative social skills).

The students are taught, coached and monitored in the use of cooperative social skills.

The use of cooperative learning strategies thus causes a dramatic shift in the role of the teacher who could be compared as follows, from that of a traditional classroom (Kennedy, 1995:140) as illustrated in table 2.3.

Traditional classroom	Cooperative classroom
Dispensing information	Planning dynamic lessons for recall
Rewarding and punishing	Teaching students how to learn
Performing for passive students	Developing students responsibility
Preparing for standardized tests	Promoting active learning
Grading workbooks and tests for student recall	Facilitating student self-evaluation

Table 2.3 The role of the teacher
(Kennedy, 1995:140).

2.4.3 The role of the learner

The use of cooperative learning techniques also requires students to assume new roles. Whereas traditional classroom situations allow and even require students do play a relatively passive role, cooperative learning requires students to be active participants and collaborators. The main tasks of the learner in cooperative learning situations are to set goals and plan learning tasks before learning; work together to accomplish tasks and monitor progress, during learning lastly to assess performance and plan future learning, after the completion of learning. (Kennedy, 1995:89).

2.5 COMPUTER-SUPPORTED COOPERATIVE LEARNING

Cooperative learning does not in principle require the use of computers, but with technology it can be further enriched and enhanced. The computer can be used in the learning process simply as a communication medium, or as a vehicle for presenting different learning areas.

According to Grobler (1995:93), the infusion of technology into cooperative learning can help to replace the view of learning that composes subject matter chunks, with a view of knowledge as a network of ideas, information and interpretation that must be exercised and revised as an alive and interconnected body. This can set a natural diffusion process into motion, through which group insight and achievement can cross-classroom, local, national and international school barriers. The prerequisite would be the availability of a local area network in the school, which is presently not available in the Brits district, and a nation wide area network for schools. International access would be the last step in making the local classroom global.

Computer-supported cooperative learning has very definite benefits to users if the medium is correctly applied and material is delivered within a well-designed management system. Some of the advantages are:

- The learning speed (pace) can be accommodated.
- Feedback is immediate; hence reasoning can be remedied if necessary.

- Cooperative learning can be enabled through positioning more than one learner to a terminal.
- Instruction can be adapted to match the entry skills of the learner.
- Limited human resources can be efficiently applied.

The increase in confidence of the individuals participating in computer programmes is also worthy of mention, as the effective benefits should not be disregarded (Benting, 1994:39).

At the intersection of these two domains, i.e. cooperative learning and computer-supported learning emerged a new body of research, cooperative learning with computers. CSCL implies a particular IT-intervention where the computer can be used in the learning process, for example, as a new communication medium or as a vehicle for introducing new ways of learning (Grobler, 1995:97).

A prerequisite for success in the CSCL environment is to organise learners for this approach. At first this new way of learning could appear somewhat chaotic if compared to the controlled traditional classroom, but after a while the learners and teachers will become accustomed to it. Initially the CSCL classroom can be difficult for the traditional teacher to manage. At this stage, the teacher must be encouraged by the values, which are added to learning for both learners and teachers in the CSCL classroom. Some of the benefits mentioned by Batson (1992) were that students are more active in such an environment and therefore are more likely to learn. Another advantage is that what students learn in a CSCL class will have more personal value for them because of their social interaction, which supports the learning process.

2.5.1 Benefits of computer-assisted cooperative learning.

The question “why use computer-assisted cooperative learning?” is fundamental to all the efforts with CSCL. How does both technology and cooperation help to shape the kind of future learning process? Some of the findings of previous researchers are mentioned are:

- **Academic achievement**

A number of studies have shown some advantages for computer-assisted cooperative learning, in the cognitive domain (Fisher, Dwyer & Yocam, 1996; Johnston,2001). These studies found that Computer-assisted cooperative learning leads to better on-task performance or higher scores on achievements tests because grouping did not negatively impact scores and learning effects were consistent across ability levels.

- **Social skills**

Various researches studying the use of computers in education have commented upon the increased task-related social interaction around the computer. The finding strongly refutes the popular belief and concern that computers will de-humanize education, lead to social isolation and impede the development of social and communicative skills.

- **Self-esteem**

According to Martin (1991;61) the reasons for the positive influence on self-esteem can be ascribed to students':

- seeing each other as academically and socially competent colleagues rather than competitors,
- experiencing positive feelings about themselves, and
- feeling and being more successful in their school work.

- **Intergroup relations**

Computer-supported cooperative learning methods embody the requirements of cooperation, and interaction even across the colour and racial barriers. (Kennedy, 1995:141). They contribute to students seeing one another in a positive light and forming friendship based on human qualities rather than on skin colour or any other difference.

- **Mainstreaming**

CSCL allows learners to develop the new competencies in education. Educational focus moves from rote skills to academic skills, from basic intellectual abilities (reading, writing, numeracy) to higher order intellectual skills (analysing abstracting, modelling) from basic vocational skills, to intricate vocational skill. It allows students to take responsibility of their learning and to make decisions.

The use of cooperative methods also increases the acceptance between physically or mentally handicapped and “normal” progress students (Kennedy, 1995:142). These advantages are amplified when computers are combining with the cooperative learning techniques. The computer provides handicapped students, whose intelligence has up till now been trapped, either because they cannot write, or because they cannot speak, with an increased measure of independence (Rutkowska & Crook, 1987:120).

- **Self pacing**

The computer's capacity for infinite patience allows each learner to progress at his or her own pace. Learning can be made sufficiently flexible to provide the option of either self-pacing or controlled pacing.

- **Variety**

With computers, interest can be added to instruction through colour graphics, sound and a variety of feedback messages to the learner's responses. Text, illustrations, movement and sound add diversity and interest to a lesson.

- **Record keeping**

The computer's ability to keep records can provide the learner, as well as the teacher, with reports of the student's progress.

- **Flexibility**

Different groups may decide on the priority list of their subtopics and how they would approach each.

- **Timeliness**

Computers are present and ready when the learner is. They are never bored, tired, or impatient with students; they are sometimes a better tutor than a human.

2.5.2 Limitations of CSCL

Although computer-supported cooperative learning techniques have the potential to be an extraordinary success, Kennedy (1995:145) warns that cooperative learning, like every innovation in education, carries within it seeds of its own downfall. These are that a large number of teachers with little knowledge of CSCL may use ineffective forms of the approach and experience which can lead to failure and frustration, secondly and the danger that the methods may be oversold and teachers be under trained.

While the use of computer-assisted cooperative learning can overcome some of the problems associated with ordinary cooperative learning, the following have been identified as critical success factors:

- **Lack of human qualities**

Some authorities claim that too much time spent with computers can inhibit a child's social development and ability to interact with people.

- **Restricted text displays**

Although computers can produce lessons with graphics, text and sound, they are awkward for presenting large amounts of written material.

- **Cost**

Few schools have enough computers and software to allow students more than the limited amount of computer access time.

- **Correlation to the curriculum**

Even when high-quality software and hardware are available, they are not valuable unless they support the objectives of the curriculum.

- **Lack of software**

The unavailability of relevant educational software is hampering the learning process.

Among the shortcomings of CSCL a mention of lack of human qualities was made. This refers to the attitude and knowledge of role players like the administrators, teachers and learners. Limited experience of teachers in the use of computers and cooperative learning approach may impede learning.



2.6 SUMMARY

In this chapter, the researcher explored concepts, which could help in understanding the topic, such as OBE, IT, CL, CSL, and CSCL. It was noted that OBE as the system of education encourages the use of technology in a cooperative environment.

Computer integration was explained as the combination of all technology parts, such as hardware and software with each subject-reacted area of curriculum to enhance learning (Morrison et al. 1999:15). Integration could help in meeting the curriculum standards and learning outcomes. Three different models of CSL integration were briefly presented. The first one being the Apple Classrooms of Tomorrow (ACOPT) Model that starts with the provision of relevant technology. Its goal is to provide insights into how technology affects teaching and learning. The second was CAMI Mathematics Model, which emphasised gradual introduction of computers into the schools, taking cognisance of the educational task to be

performed and the teachers' capabilities at each stage. The last was the Make It Happen! (MIH) model, which focuses on integrating technology into the curriculum to meet the CSCL needs.



CHAPTER 3

RESEARCH DESIGN

3.1 INTRODUCTION

In order to answer the research questions posed in chapter one, a suitable research approach had to be identified. The purpose of this chapter is to explain the research approach, as well as the basic underlying philosophy of understanding that is followed in this study. In discussing the process of identifying an appropriate research approach, Pieters (2001:2) suggested that the researcher has to consider the purpose of the research and also the nature of the phenomenon under investigation. This study investigates how CSCL had been integrated in selected secondary schools in the Brits District. In this chapter the research paradigm, research method, data collection techniques and data analysis methods are discussed.

3.2 RESEARCH PARADIGM

Paradigm can be defined as that which “defines what should be studied, what questions should be asked and what rules should be followed in interpreting the answers obtained” (Grobler, 1994:27). Paradigms as described in the human and social sciences help researchers to understand phenomena. The phenomenon to be understood in this study is the integration of CSCL in the FET band. The Paradigm encompasses the way the researcher looks at the problem and how he/she approaches it to come up with trustworthy data and credible results. There are two main paradigms that are widely discussed in the literature, namely qualitative and quantitative approaches.

The quantitative is termed the traditional, the positivist, the experimental or the empiricist paradigm. The qualitative paradigm is termed the constructivist approach or naturalistic. Qualitative research typically entails in-depth analysis of relatively few subjects for which a rich set of data is collected and organized (Creswell, 1994:3). On the other hand, quantitative research entails the proper application of statistics to what are typically large numbers of subjects. When applied, quantitative research is arguably much more statistically effective. Qualitative methods will help in this study to establish the extent to which integration has

been carried out, as well as the procedures followed by selected secondary schools in their integration programmes.

An understanding of target group, which is the FET and their impressions about the use and integration of CSCL, was clearly investigated through observation and case study that are the methods of qualitative approach. The data collected qualified attitudes, impressions and viewpoints. Consistent results across multiple interviews provided necessary information for decision-making.

In this study, qualitative approach was more suitable because an intact group of learners was investigated in a natural setting. Observational data was collected. The research process was flexible and typically evolved contextual response to the lived realities encountered in the field setting. The method was also used in case studies, and interviews. In case studies, the researcher explored a single entity or phenomenon; “the case” bounded by time, activity and collected detailed information.

3.3 THE RESEARCH METHOD

Qualitative research uses unreconstructed logic to get at what is real, the quality, meaning, context or image of reality in what people actually do, not what they say they do, as in questionnaires. Unreconstructed logic means that there are no step-by-step rules, that researcher ought to use. This is one reason why qualitative approach was more relevant to the study (Bless & Higson-Smith, 1995:43).

Qualitative research can be explanatory or descriptive in approach. It gains insight into a situation and gives a better understanding of the environment under investigation. There are two alternatives for the descriptive research namely the case study and the survey. The researcher chose the case study because of its detailed and thorough investigation compared to survey. The case study is a way of organizing social data and looking at the object to be studied as a whole. Selection of schools was done through a survey, which was conducted through the assistance of the district office, in preparation for data collection. Nine secondary schools were identified through their involvement in computer-supported learning. In the process, a better understanding of the problem under investigation was gained, helping the

researcher to reach conclusions in an interpretive and inductive way, which in turn improved the framework of understanding the problem under investigation. One stage of analysis namely the “within-case” analysis was applied. The within-case analysis was confined to the individual case-study. The cross-case analysis could not be conducted because eventually it was realised that only one secondary school had introduced CSCL. The particular school was used as the case study.

The case study is the method of choice for studying interventions or innovations (Lancy, 1993:140). It may be referred to as “experiments” because they measure “outcomes”. The outcome to be measured in this study is integration procedure in the introduction of CSCL. Case studies, as qualitative research method are often criticised for being unrepresentative because of their small sample.

Case study method is used in this study to afford the researcher the opportunity to meet the respondents and collect data through interviews and observations. The researcher will not come to understand the environment in which teachers and students are subjected to.

3.4 DATA COLLECTION



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The main purpose of collecting data was to understand context, processes and events in everyday setting at selected schools with computers. This study used interviews, observation and documents to gather information.

3.4.1 Interviews

An interview guide was drawn to assist the researcher to gather statistical information like the number of computers and the programmes used by the school. Nine computer educators and learners from selected schools were interviewed. The interview was audio recorded and later transcribed. The two versions constituted the material for subsequent interpretation of data. Interviews helped in obtaining specific information about CSCL. All of the people interviewed are referenced in the text and listed in the Reference List.

3.4.2 Observation

Observation can be described as complete participation, participant as observer, observer as participant and complete observation (Lancy, 1993:155). Then later used because it could accommodate case-study designs, which are relevant to this study. A number of schools were observed in a reasonably short time. The researcher became a non-participative member.

The researcher observed how CSCL was used in selected schools. A semi-structure method of observation was used with particular focus on integration of CSCL. Open-ended approach was adopted so that all different integration methods could be assessed on their merits. The researcher therefore did not come with any prior assumptions. Learners were observed interacting with one another through the use of computers.

3.4.3 Documents

Documents encompass various pieces of printed material on the CSCL, produced by the school or district office. Every piece of paper represents a potential source of data for the qualitative researcher. Added to the official records and archives of the school, are writings of individuals such as diaries, letters and articles about computer education.

Document could give the historical background of computer education, educators' portfolios and policies on CSCL. Those documents indicated the strategic plan intended to be followed either in short or long term. Other documents included logbooks, newsletters, syllabus, curriculum documents and minutes of meetings. Schools that were advanced in CSCL availed their learners' portfolios.

3.5 DATA ANALYSIS METHODS

Qualitative data analysis is the process employed to "reduce" data from intensive interviews or holistic observations in such a way that it becomes distilled to its essentials, rather than simply being diminished in volume. This process involves skilled perception and artful transformation by the researcher (Tesch 1990:10). The procedure cannot merely consist of a random division into smaller units. There has to be a "method" to the process; which is

systematic and goal-oriented, leading to the result that others can accept as representing data. Yin (1994:36) presented two strategies for general coding approaches: One is to rely on theoretical propositions of the study, and then to analyze the evidence based on those propositions. The other technique is to develop a case description, which would be a framework for organizing the case study. Kelle (1997:3) stated that coding is the necessary prerequisite for a systematic comparison of text passages; text segments retrieved and analysed. He gave three types of coding, namely the one drawn from common-sense knowledge, abstract theoretical concepts and “theory”. The first type was used in this study because it accommodated “vivo codes” (words which were used by the interviewee) and “open coding” which allowed diverse opinions from interviewee. Interviewees were exposed to an open interaction with the interviewer on CSCL.

Data analysis was conducted as an activity simultaneously with data collection, data interpretation and narrative report writing. Information was collected from the schools, sorted in categories, formatted into a story or picture and written in qualitative text. Analysis was based on data “reduction” and “interpretation”; voluminous amount of information about the background of the school, the number of teachers offering lessons through computer-supported skills, how learning is enhanced through computers, was reduced to patterns, categories and themes and then interpreted by using some schema. Tesch (1990:56) called this process “de-contextualization” and “re-contextualization”.

A coding procedure was used to reduce the information into themes or categories identified by the researcher. Flexible rules were used on sorting through interview transcriptions, observational notes, documents and visual material. It was clear, however that one formed categories of information and attached codes to them. These categories and codes form the basis for the emerging story to be told by the qualitative researcher.

Tesch’s (1990) eight steps to consider were followed:

1. Ideas were jotted down as they came to mind about the research interview.
2. One document (one interview) was selected and the following questions were asked:
What is this about? Which thoughts can be written about it?
3. A list of all topics was made.

4. The topics were abbreviated, as codes and the codes written next to the appropriate segments of the text.
5. The most descriptive wording was found for the topics and they were turned them into categories. Topics that relate to each other were grouped together.
6. A final decision on the abbreviation for each category was made and put in alphabetical order.
7. The data material belonging to each category was assembled in one place and used for preliminary analysis.
8. It was not necessary to recode the data.

The triangulation approach used in this research allows data from a variety of research instruments to be integrated in order to come up with a coherent and holistic answer to each question. Data from observation of documents and interviews will be combined in the discussion of each research question.

3.6 MEASURES TO ENSURE TRUSTWORTHINESS AND VALIDITY

Qualitative research can be evaluated through trustworthiness and validity. The true-value is determined by whether the researcher has established confidence in the truth of the findings for the subjects or informants and the context in which the study was undertaken (Krefting, 1991:215). In this research, truth-value was obtained from the discovery of human experiences in CSCL, as they were lived and perceived by informants from selected schools in the Brits district.

3.6.1 Trustworthiness

Guba's (1981) model of trustworthiness is based on the identification of four aspects of trustworthiness, namely: truth-value, applicability, consistency and neutrality. These strategies are important to researchers in designing way of increasing the rigor of their qualitative studies and also for readers to use as a means of assessing the value of the findings of qualitative research. Only credible contributions was collected and analysed.

Credibility

Credibility has to do with something that is believable. Extending time period so that rapport could increase can attain it. Persistent observation of a phenomenon under various natural situations and sampling all possible situations could be of great help to ensure credibility. Extended time period and persistent observation would be put into practice in this study.

Acceptability

Acceptability refers to the degree to which the findings can be applied to other contexts and settings or with other groups. Findings of this study may be tested in different settings for their applicability. If the findings can be replicated with the same subjects or in a similar context, then the research is regarded as consistent.

Neutrality

The fourth criterion of trustworthiness, which is neutrality, refers to the lack of bias in the researcher's procedure and results. It is the degree to which the findings are a function solely of the informants and the conditions of the research, without the influence of the researcher. The researcher in this study facilitated the proceedings in an impartial approach to ensure neutrality.

3.6.2 Validity

Validity means whether one has in fact investigated what one wished to investigate. It asks the question: "Does a measure actually measure what it is believed to have measured? Does that agree with reality?" (Lancy, 1993:46). Without validity, one would have a meaningless result and would have wasted time and energy. For data to be valid, it must be appropriate, meaningful and useful (Kvale, 1983:191). Validity was checked through comparisons of data with previous researches and consideration of the usefulness of data for policy making.

Validity, reliability and credibility are measures to ensure trustworthiness (Newman, 1999:2). They are used to establish the truth-value of the research that is critical to the accurate representation of subjective human experience.

3.7 SUMMARY

This chapter focussed on the selection of a paradigm and the analysis of collected data. Mainly the qualitative approach, through the observation, interviews and case study methods, was used in trying to understand the integration of CSCL in the selected FET band in Brits district. Survey was used on a minimal scale to collect statistical data of schools, which participated.

Qualitative research approach was selected because of the type of the research question, which needed descriptive information on the situation in secondary schools. Insight was gained through unreconstructed logic.

Two forms of data collection, which are interviews and observation, were used. Interviews were semi-structured to allow the interviewees to share their impressions about CSCL. Simple observations, which is not obstructive and systematic was more suited because of limited time. Data collected will be discussed in the next chapter.



CHAPTER 4

DATA ANALYSIS, INTERPRETATION AND FINDINGS

4.1 INTRODUCTION

In this chapter, data will be systematically reviewed under the headings of the research questions and organised to determine how computer supported cooperative learning is integrated into selected schools curriculum in the FET band, in Brits district. The chapter is outlined in the following sub-topics: firstly, prevalence of computers for integration, analysis of the use of computers for CSCL, Teacher' experience, learners' experiences, discussion and summary.

4.2 PREVALENCE OF COMPUTER INTEGRATION IN THE BRITS DISTRICT

The situation of computer integration in the Brits district can be explained by the following statistical information:

- There are thirty-six secondary schools of which thirty-two are government and four are independent.
- Thirteen secondary schools have computers. This is only 36% of all the secondary schools.
- Eleven (30%) use these computers for instruction and learning.
- One (3%) uses the computer for CSCL.

4.2.1 The availability of computers in the selected schools

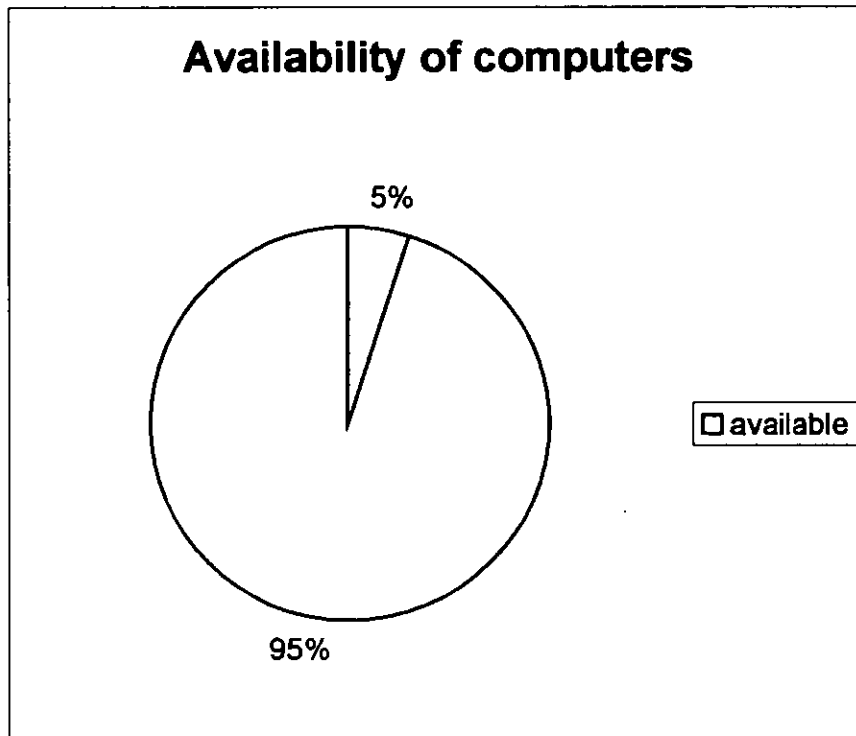


Fig. 4.1 Availability of computers



The total numbers of learners at the nine secondary school visited was 5652, with a total of 283 computers, which reflects only 5% of the learners at a ratio on 1:1. Non-availability of computers was prevalent in all the schools. Computers were used for management and instruction and learning. None of these schools used computers for action research as illustrated in figure 2.4. Those used for instruction and learning, had to serve a range of functions such as computer literacy, computer assisted instruction, computer managed instruction, design of teaching material and construction of knowledge.

4.2.2 The number of computers in relation to individual school enrolment

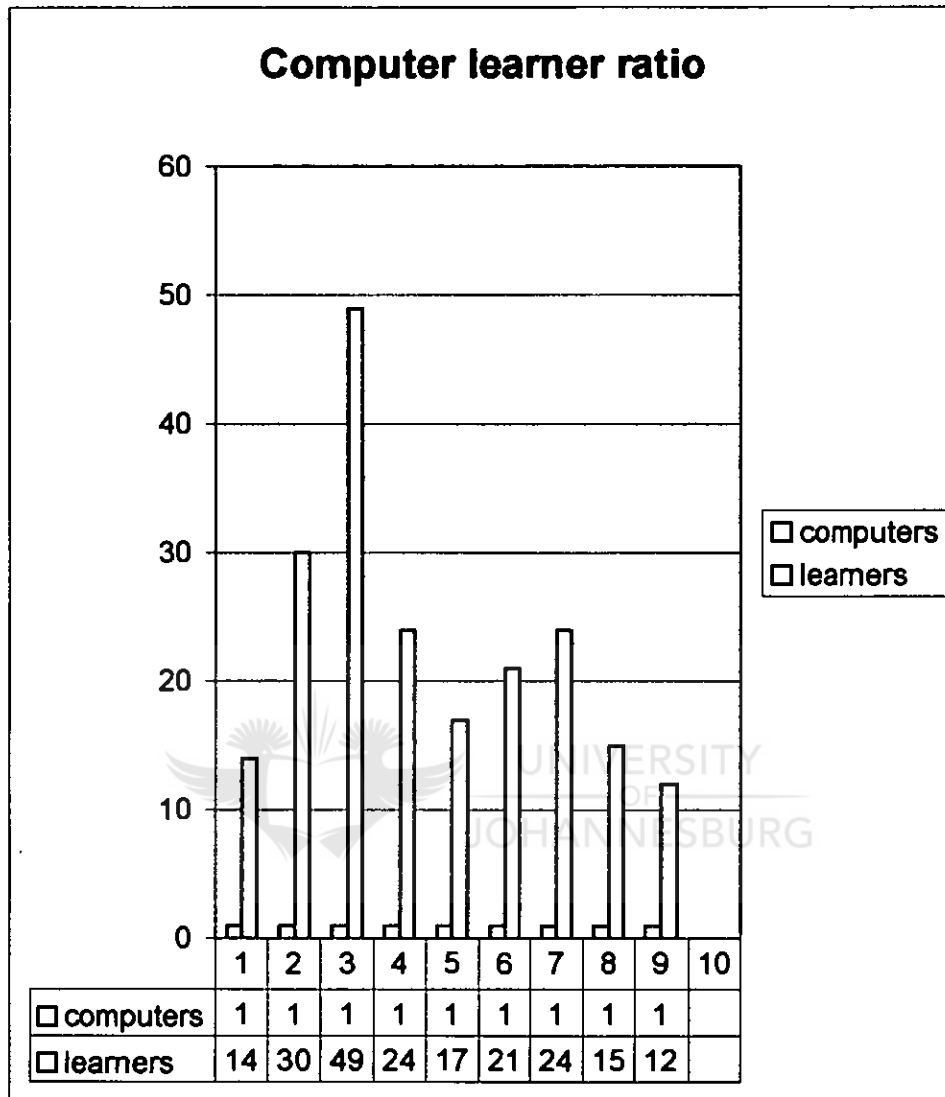


Fig. 4.2 Computer learner ratio

Figure 4.2 illustrates the number of computers in relation to the number of learners in each school in the selected secondary schools in the Brits district. The ratios are abnormally high. The lowest ratio of 1:12 is from school 9, with an enrolment of 280 and 25 computers. School 1, with an enrolment of 1100 learners, and 76 computers has a computer learner ratio of 1:24. The highest ratio of 1:49 is from school 3, with an enrolment of 733 learners and only 15 computers. Lack of computers will hamper learning.

4.2.3 Computer literacy as a component of instruction and learning

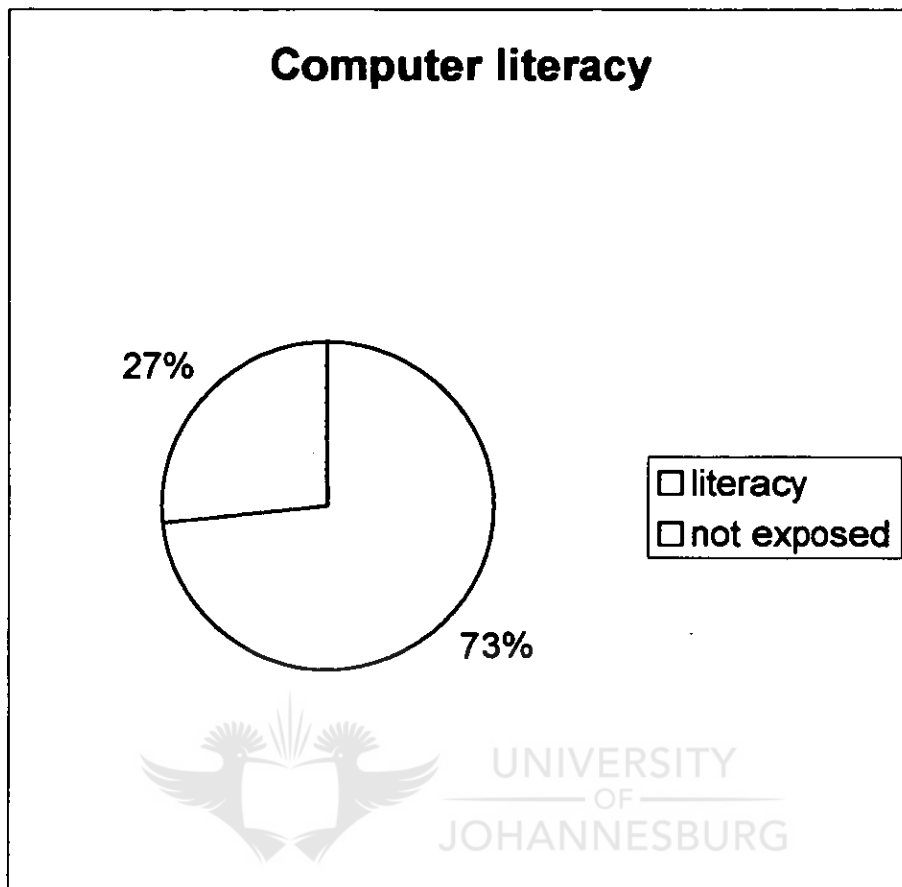


Fig.4.3 Computer literacy

A total of 4152 learners, which is 73% of all the schools investigated, were taught computer literacy. This is a significant number, considering the number of computers at each school. Computer literacy was offered with other computer related subjects, such as Computer studies with 217 (4%) learners, Computer typing, 321 (7%) and Computer science 191 (4%), as illustrated in Figure 4.5.

4.2.4 The qualifications of computer educators

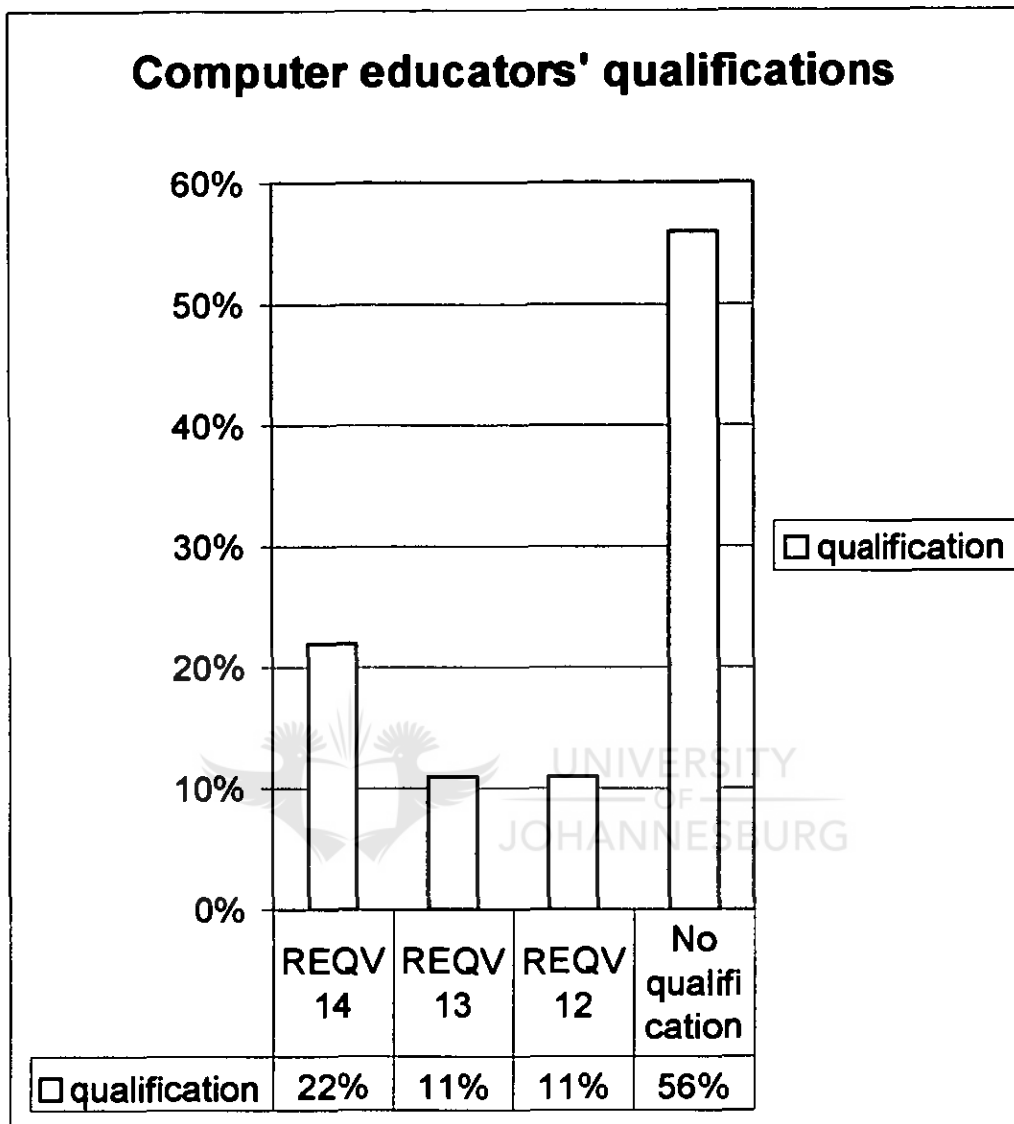


Fig. 4.4 Computer educators' qualifications

Only two (22%) educators from a total of nine were qualified with a relevant B Sc. degree. One (11%) had a three-year diploma in Computer typing. One (11%) was under qualified with one-year formal training in computers. The largest number of 5 (56%) was unqualified. Computer educators' qualifications need an urgent attention because it impacts negatively on productivity.

4.2.5 The computer related subjects

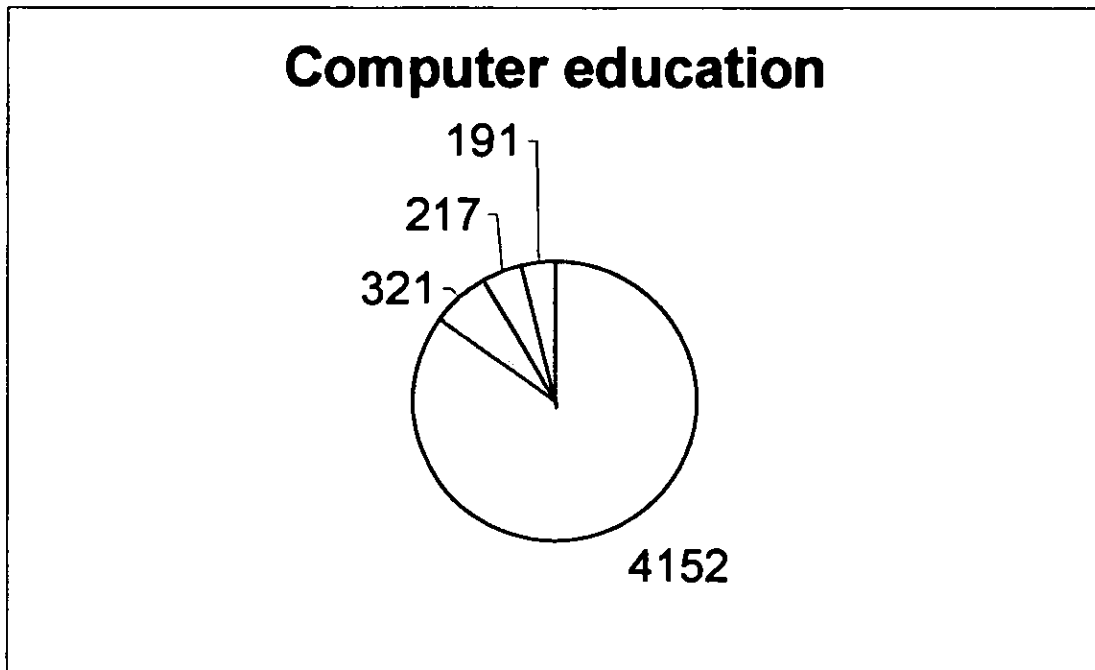


Fig. 4.5 Computer education

Figure 4.5 indicates that computers were used mainly for computer literacy with 4152 learners. Computer studies, Computer typing and Computer science catered for 321, 217 and 191 learners respectively. The following table reflects the situation in terms of the nine schools interviewed:

Computer related learning	Computer literacy	Computer studies	Computer typing	Computer studies	Computer assisted instruction
No. of schools	9	2	2	2	4

Table 4.1 Computer related learning areas

Four secondary schools had already introduced computer-assisted instruction by offering the following subjects through the computer: Biology, Accounting, Mathematics, Physical science, History, English, Typing, Economics and Geography.

4.2.6 CSCL in the Brits district

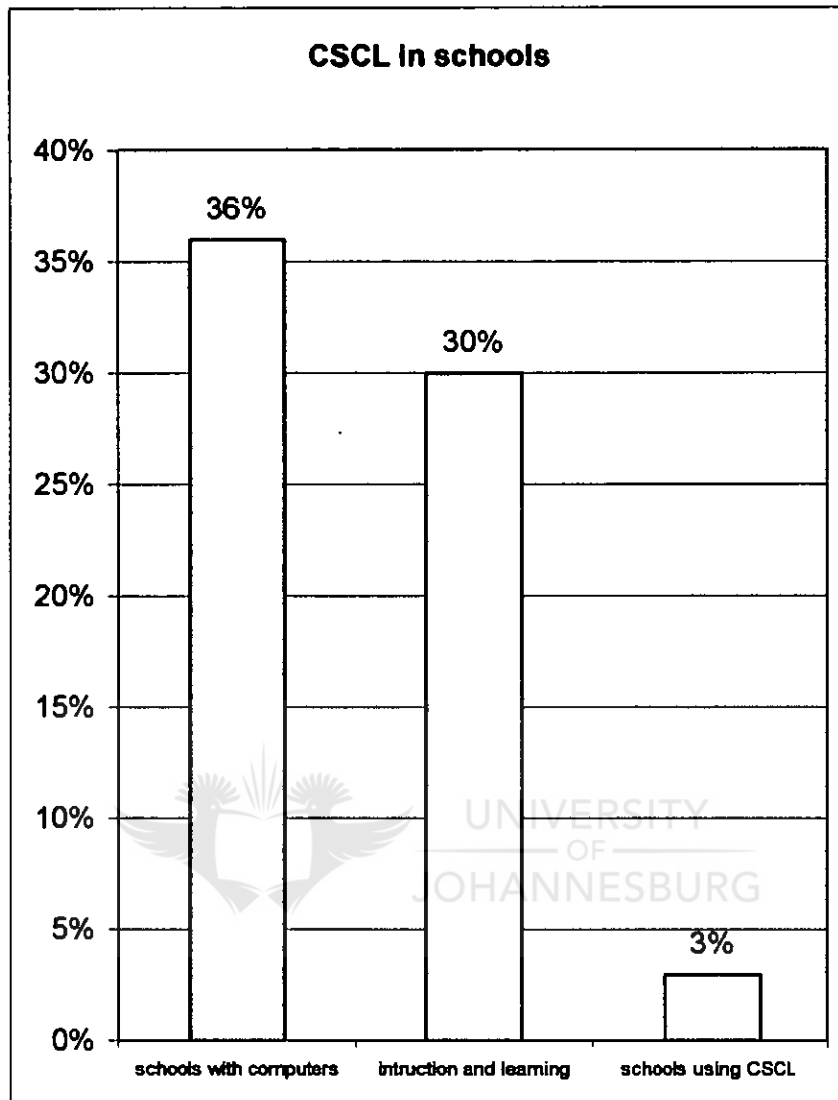


Fig. 4.6 Computer-supported cooperative learning (CSCL)

One school, which is 3% of a total of 36 secondary schools in the Brits district, was using CSCL to enhance learning. To many secondary schools, CSCL was still an unknown concept, which had not been thought about. For this reason one case study was conducted at the school.

4.3 THE CASE STUDY

A case study was conducted at one secondary school that used CSL and CSCL. The school in question will be referred to as school "A".

4.3.1 School Context

School "A" is a private school in Brits, which caters mainly for black learners from the neighbouring villages and townships. Its enrolment is about 450 learners. It was still a small school compared to others in the surrounding area.

4.3.2 Computer infrastructure

The school had 21 computers, housed in a computer laboratory. The educator in charge had more than ten years experience in computer education and held a one-year certificate in Computer typing. A technician was always available to attend to the upgrading and service of the computers. Computers were linked to one another for one-to-one communication to be possible. Course delivery system or tutorials were accessed from the computer. Part of the learners' daily exercises was information retrieval, processing, locating, consulting people and information through Internet and Web pages.

Even though learners were not ideally seated in groups, they were giving help and receiving assistance from their classmates. Two learners were working together at one computer. Files were transferred from one computer to the other.

All 450 learners were taught computer literacy and CSCL was used mainly in English, Afrikaans and Art. In addition to computer CSCL programme, some learners were exposed to computer typing and their statistics are reflected in table 4.2.

Grades	8	9	10	11	12
Learners	45	29	12	17	6

Table 4.2 Computer typing learners

Educators worked coherently with the computer educator in designing teaching materials and tutorial. She oriented them on how to use various computer programmes. Even though there was no specific timetable for other subject teachers who took their learners to the laboratory, the computer educator stated that at least once a week, each teacher brought his/her learners to the laboratory.

The computer educator's philosophy was to assist her colleagues through her computer expertise. The teachers knew that they were the ones who were to do the rest with the learners. She helped with technical problems, gave suggestions if the teacher had a problem, but generally it was up to the teacher to teach the lesson.

The school computer plan included the following responsibilities:

4.3.3 Computer educator's responsibilities

- Support and encourage learners / students and staff in their use of computers.
- Help integrate computers into the curriculum.
- Oversee laboratory supervision.
- Select suitable textbooks for computer subjects.
- Advise the school management on any developments in computer technology.
- Assure continuation of a strong computer programme.
- Make recommendations to staff regarding major decisions about computers.
- Approve all hardware and software purchased.
- Accept feedback from individual staff members and advise other members.

4.3.4 Other educators' responsibilities

- Attend required in-services throughout the year.
- Take classes to the lab at scheduled times.
- Be responsible for proper handling of hardware and software when supervising learners in the laboratory.
- Teach off computer lessons in the classroom to assure that time spent in the laboratory are well used.
- Give feedback to computer teacher to ensure personal development.

Interview and observation data was typed and coded through a metacode (explanatory). Explanatory codes emerge from personal experience with the sites and repeated themes or words or causal explanations of outcomes that were offered by site people or what emerge from our own musing (Lancy, 1993:156).

4.4 DISCUSSION

The researcher noted the following points, which are explained in detail in Appendix D, on "Quotes":

- Educator's computer competence was very low at school "A". With only diploma in Computer typing one is not qualified to handle programmes such as CSCL. In spite of the qualification computer literacy and CSCL were offered. Refer to fig. 4.7. In computer literacy the following modules were taught: Word processing, Excel, Power Point, Internet Access, Access and Desktop Publishing.
- Support from the district office was lacking. The educator expressed her frustrations from lack of guidance from the subject advisory services. Documents such as syllabi and policies were unavailable and this does not give a good impression about learning.

- Individual educators prepared learning material with the assistance of the computer educator.
- The computer educator's experiences were numerous. She was pleased with the progress of the learners in computer related learning areas. She accessed learners' work even at home through her computer "link". She was able to handle her work-load because she had enough time to attend to other duties such as controlling, during the lessons. The biggest challenge mentioned was to secure necessary documentation, choosing suitable software material and developing learning material.
- Learners had fun with computers. They stated that they interacted with one another and shared information. They worked in pairs, searched for information on the Internet for their assignments and projects.

4.5 RESEARCH FINDINGS

Five research aims are discussed in the following section.

4.5.1 Findings of aim 1

To determine what computer-supported cooperative learning is.

CSCL has been explained in chapter 2, as a sub-section of computers in education that deals with instruction and learning. It is identified by indicators such as asynchronous and synchronous communication, sharing knowledge through computers transferring information/files and accessing information through web pages.

With regard to this aim, the respondents knew little about CSCL. To them it was a new concept, which was still to be explored in the future. Only one computer coordinator was in a position to explain how she was integrating CSCL into the curriculum. Integration was not clearly documented at school "A", because important documents such as policy and strategic plan were not drawn. There was a need for teachers to be exposed to CSCL approach.

4.5.2 Findings of aim 2

To determine the extent to which CSCL has been integrated into learning.

With the advent of OBE in the FET band in the year 2003, cooperative learning should be the norm. Collected data indicated that only 3% of secondary schools in Brits district, uses CSCL. The school in question had only two years experience in this approach. 3% is insignificant and therefore there is a dire need for more schools to enjoy the benefits of this learning approach. Most of the schools visited by the researcher were offering Computer literacy only.

4.5.3 Findings of aim 3

To identify shortcomings experienced in the integration process.

A variety of general and particular impediments had been identified in the previous chapter. These obstacles need to be addressed to enable integration to succeed. The shortcomings identified in this research can be classified as both professional and administrative.

Professional issues are those that had to do with the computer educators' qualifications, documents like CSCL policy, integrated syllabus and guidance from the district and how to impart knowledge through computer-supported cooperative learning. Administrative issues include equipment and infrastructure. Both professional and administrative shortcomings hampered the integration of CSCL in the Brits district.

4.5.4 Findings of aim 4

To determine how computers can be integrated into the FET curriculum.

Three models on the integration of computer-assisted education have been discussed in chapter 2, namely the ACOT, CAMI and MIH. The goal of ACOT model is to provide insights into how technology would affect teaching and learning. (Fisher, et al. 1996:2). CAMI model intended to introduce computers gradually into the school, taking cognisance of the educational task to be performed and the teachers' capabilities at each stage, matching the

hardware with the soft ware deployed at each stage (Vorster, 1996:16). MIH model focussed on the integration of technology into the curriculum to meet the needs of all students. None of the three models was used at the schools “A”. This is indicative of the lack of guidance to the computer educator in the Brits district.

4.5.5 Findings of aim 5

To suggest strategies for the integration of computer-supported cooperative learning into secondary schools.

“The best strategy for technology integration into curriculum, in a cooperative environment is to put the technology into the hands of trained teachers, make it easier to access and let them decide how best to use it in instruction and learning (Morrison, et al. 1999:16). Teachers’ qualifications in computer education were very low, at 56% unqualified and only 22% with REQV 14 level.

Other finds are:

- Start with a small group of learners and few learning areas.
- Solicit expert advice from tertiary institutions, department or colleagues who have already introduced CSCL.
- Do a thorough planning on acquisition of equipment and its maintenance plan.
- Carefully select suitable the learning material.
- Consider the sustainability of CSCL programmes.

4.6 SUMMARY

Chapter 4 outlined the findings of the empirical investigations conducted to determine how CSCL was integrated into the senior secondary school i.e. the FET band in the Brits district. A case study of one secondary school that used CSCL was presented together with the quotes from the teacher and learners. From this information, five research questions were answered.

The more pronounced problems from the respondents could be ascribed to lack of support from the district, poor teacher qualification and poor planning. Technology integration's effectiveness should be continuously assessed to ensure that it is appropriate for the learners, meets learning objectives and enhances learning.



CHAPTER 5

RECOMMENDATIONS AND CONCLUSION

5.1 OVERVIEW OF THE STUDY

This study explored CSCL, as a potential vehicle to support learning in the F.E.T. band. CSCL is not only advocating for a more efficient learning process, but also a more effective one (Grobler, 1995:101). This approach could, eventually open the world of learning, with its restrictions. CSCL should not be seen as a panacea, offering Brits district an instant solution to all its educational problems. It should be regarded as part of the educational development that can offer many benefits. Quantitative paradigm was used through which a case study, observations and tape recorder interviews were applied in data collection. Lack of computer education and CSCL was evident. Findings and recommendations were made on the strength of the situation in selected schools.

This chapter centres its attention on the summary of all the preceding chapters, recommendations, contribution of the study, further research topics and final word.



5.2 SUMMARY

Chapter 1 presented the introduction of the topic, stating clearly the problem investigated. The major focus of the study was to find out ways in which Further Education and Training learners in selected secondary schools in the Brits district of the North West Province had progressed in the integration of CSCL into the curricula.

Chapter 2 explored concepts, which helped the researcher in explaining the topic in details, such as OBE, IT, CL, CSL, and CSCL. It was noted that OBE as the system of education in South Africa, encourages the use of technology in a cooperative environment.

Computer integration was explained as the combination of all technology parts, such as hardware and software with each subject-related area of curriculum to enhance learning (Morrison, *et al.* 1999:15). Integration helps the user to meet the curriculum standards and

learning outcomes. Three different models of CSL integration were briefly presented. The first one was the Apple Classrooms of Tomorrow (ACOPT) Model that starts with the provision of relevant technology. Its goal was to provide insights into how technology affects teaching and learning. The second was CAMI Mathematics Model, which emphasises gradual introduction of computers into the schools, taking cognisance of the educational task to be performed and the teachers' capabilities at each stage. The last was the Make It Happen! (MIH) model, which intends integrating technology into the curriculum to meet the needs of all students.

Chapter 3 concentrated on the selection of a paradigm and the analysis of collected data. Mainly the qualitative approach was applied because of the nature of the research topic. Case study was used to enable the researcher to learn from practice through observations and interviews. Documents that encompassed various pieces of printed material on the CSCL were requested from the respondents, because every piece of paper represents a potential source of data for the qualitative researcher.

Chapter 4 outlined the findings of the empirical investigations conducted to determine how CSCL was integrated into the senior secondary school i.e. the FET band in the Brits district. A case study of one secondary school that used CSCL was presented together with the quotes from the teacher and learners, from which five research questions were answered. The more pronounced problems from the respondents were ascribed to lack of support from the district, poor teacher qualification and poor planning.

Chapter 5 discussed five recommendations and ended with the suggestion that Computer-supported cooperative learning as a potential vehicle for enhancing learning in OBE approach, be integrated in the Brits district. Technology and group learning are some of the cornerstones of this new education system in South Africa. This research comes at the time when OBE is about to be phased into the FET band. The level of integration of CSCL in the FET band was low. From thirty-two provincial and four independent secondary schools in the Brits district, only one seemed to have registered progress in this learning approach. A variety of factors, which hindered and indeed constrained the development process were identified in this study and ways and means were proposed for removing or bypassing these obstacles.

There is a need for all the secondary school with computer education to cooperate in their effort to integrate CSCL. District subject clubs in the case where there are no subject advisers, could serve a pivotal role.

5.3 RECOMMENDATIONS FOR THE INTEGRATION OF CSCL

The following are recommendations for the integration of computer-supported cooperative learning in the Brits district. They cover the following headings: planning, assessment of resources funding, professional development, curriculum integration and establishment of timeline.

Recommendation 1

The Brits district shall play its role, as the administrative and professional resource centre for all the schools in the area.

Motivation

Computer educators stated categorically that they did not receive any assistance from the district. The role of the district among others is to provide administrative and professional services to the teachers. School district administrators should plan carefully for every aspect of technology, from purchases, installation to staff development.

Planning can be classified into short-term and long-term. What can be achieved in the near future and in the distant future must be clearly outlined in their order of priority. Role players, such as the local business community, government representative, SGBs, educators and learners, are to be involved in the preparatory planning for CSCL programme in the district. This step will come out with principles and policies to be adopted.

Recommendation 2

Educators should be encouraged to study Computer education, CSL and CSCL approaches. Educators are regarded as agents of change, without their positive contribution to technology integration not much will be achieved.

Motivation

Most of the qualification levels of computer educators were not appropriate for the grades they were teaching. The teacher who used CSCL at school “A” held diploma in computyping. There is a dire need for teacher development in computer related studies. Bursaries and special leave with pay should be made available by the education department through the influence of the district. Bursaries and/or special study leaves should be offered to teachers to pursue technology education.

Recommendation 3

A task team should be established to manage educational changes towards technology as computer-based system.

Motivation

A team comprising of stakeholders such as educators and district officers should be established to spearhead the process of the integration of CSCL. The team will focus on the integration of technology into the OBE curriculum, design, implement and evaluate a curriculum that uses computers to support learning. The Make It Happen! Model may be used.

Recommendation 4

“Linking” should be encouraged among the schools in the district, to cultivate the spirit of cooperation and interaction.

Motivation

Linking will create learning communities within the district. Schools and learners will share knowledge and information with ease. Cooperative learning will be enhanced on a broader scale. Learning material and interaction are necessary for the development of CSCL and this will be accessed easily through linking. Linking can initially be confined to a small area.

Recommendation 5

School based computer coordinators should establish timelines so that progress can be monitored and evaluated.

Motivation

Two elements of time required can be considered: the pilot or demonstration period and the school or district implementation. Timelines will help the project coordinator to continuously assess progress. The element of time can be reflected from the planning stage to the very last stage of implementation.

All the suggested recommendations are only a starting point to initiate a specific technological intervention from a theoretical basis. Their intention is to increase the success rate of the integration of CSCL in the FET band in the Brits district.

5.4 CONTRIBUTION OF THIS STUDY

The contribution made by this study to the field of knowledge can be evaluated by its objective of investigating how CSCL was integrated and the suggested framework for implementation of CSCL in selected secondary schools. A problem of changing from the traditional approach to computer-supported cooperative learning has to be addressed. With the

integration of CSCL one is therefore not only addressing the educational needs, but also receiving as a bonus social benefit. Learners learn the social principle of working together in groups, sharing ideas, cooperating and developing computer skills. Learners come to understand that even though they are different, they can still work together for a common goal.

5.5 LIMITATIONS OF THE STUDY

Four limitations of the study are noteworthy. The first one is the small size of the sample examined. The present study examined the work of nine projects in secondary schools, from which only one had already advanced to the level of the integration of CSCL.

The second limitation is the nature of the sample. The present study examined integration of CSCL in schools where a higher degree of implementation was reported. Thus the present sample lacked the inclusion of ineffective schools, which are in the majority.

The third limitation is the method of data collection. Data was gathered primarily by interviewing teachers and learners involved in computer education. While relevant documents were examined and classroom observations conducted, a majority of the data was based on informants' perceptions of the computer programmes and subjects. Implementation effects were based on informants' perceptions of such effects rather than on the use of measures involving direct observation.

The fourth limitation was the level of computer-integrated learning. A majority of secondary schools in the Brits district did not have CSCL as part of their curriculum. The study had little option of schools to select from and does not reflect the demography of the district.

5.6 FURTHER RESEARCH

This research, like most others, has not exhausted the problem area and a variety of further research topics are possible. Some of those are:

- The OBE integrated curriculum design for CSCL.

There is a close relationship between OBE and CSCL, which needs to be explored, in a research project, because they are complementary. OBE advocates learning technology and through technology, learning in groups in a learner centred environment.

- The programme for in-service training of current teachers.

Teachers, who are already in the system, cannot be dismissed because this will be undesirable and not cost-effective. They can be re-trained to meet the challenges of CSCL. A relevant in-service programme can be designed, taking into consideration their levels of computer knowledge and commitment in adapting to change.

- The development of an integrated teacher-training curriculum.

For a programme to be sustained, continuous production of relevant personnel should be maintained. Teacher trainees will be trained on how to use integrated CSCL curriculum. The development of this curriculum is vital in ensuring that the newly recruited teachers can produce quality learners.

- The OBE and cooperative learning.

OBE and CL can be unfolded separately and later be compared with one another. The researcher may even investigate the extent to which OBE uses the cooperative learning approach.

- The guidelines for the implementation of CSCL in the rural Brits district.

Demography of rural environment is different from that of urban or semi-urban areas. Rural areas are characterised by adverse poverty, high literacy and high unemployment rates. Their guidelines may not necessarily be identical to those of schools that accommodate learners from well-to-do families.

5.7 FINAL STATEMENT

Most educators recognise a clear trend towards greater computer use in schools (Marting, 1991:261). In the Brits district an increasing number of schools are acquiring computers. Presently all the secondary schools in the district have at least one computer for administrative purposes.

This study aimed at investigating the integration of CSCL in the school curriculum. It was realised that before this could be achieved, a number of steps should be taken to ensure effectiveness of the programme. Some of those elements are:

The district and school policy on integration of CSCL should be drawn, to guide the educators in their endeavours to achieve the set objectives. It is imported to have competent and knowledgeable individuals to lead the process of integration. Current and new teachers be subjected to an intensive training. The computer-support infrastructure is a prerequisite to integration.

With the introduction of OBE, it is imperative that CSCL be used to achieve learners outcomes. According to OBE, the rationale for each Learning Area, the Learning Area Outcomes and the Specific Outcomes are all based on working effectively with others as a member of a team, group, organisation and community (cooperative learning) and using science and technology effectively and critically, showing responsibility towards the environment and health of others.

Bibliography

ADAMS, D & HAMM, M 1996: Co-operative Learning (Critical Thinking and Collaboration Across the Curriculum) (2nd edition). Springfield: Charles C Thomas Publishers. pp 146-150

ADDRESS BY PROFESSOR KADER ASMAL, MP, MINISTER OF EDUCATION, AT THE LAUNCH OF THE INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION STRATEGY (2001:Pretoria)

ARY, D; JACOBS, LC & RAZAVIEH, A 1990: Introduction to research in education, 4th edition. Fort Worth: Harcourt Brace Jovanovich College Publication. p 43.

ASMAL, K 1999: Call to action: mobilising citizens to build a South African education and training system for the 21st century. Pretoria: Government printers. pp 2-3.

BATSON, T 1993: Network-based classrooms: promises and realities. Cambridge: Cambridge University Press. pp 45-56.

BEALS, DE 1991: Computer-mediated communication among beginning teachers. T.H.E. Journal vol.213. pp 71-77.

BENTING, LA 1994: Computer Supported Education: Pitfalls, Potholes and achieving the goals. (In Alexander, PM 1994: Computer-Assisted Education and Training in Developing Countries: International Conference 10 – 14 October 1994).

BLESS C & HIGSON-SMITH C 1995: Fundamentals of social research methods an African perspective (2nd ed) Cape Town: Juta and co. Ltd. p137.

CHUNG, J 1991: Collaborative learning strategies: The design of instructional environments for the emerging new school. Educational Technology, XXXI (12), pp 15-22.

CORNU, B 1996: *New Technologies: integration into education*. (In: Watson, D & Tinsley, D 1996: *Integrating information technology into education*. London: Chapman & Hall) pp 3-11.

CRESWELL, JW: 1994. *Research design: qualitative and quantitative approaches*. Thousand Oaks, Sage. pp 153-156.

CULBERSTON, D 1999: *computer labs versus Classroom integration of computer* (Online) dculbert@kde.state.ky.us.

Accessed: 12 March 2002.

DAVIDS, RA 1994: *Technology to the rescue*. (In Alexander, PM 1994: *Computer-Assisted Education and Training in Developing Countries: International Conference 10 – 14 October 1994*). pp 61-62.

DAWES, L 1999: *First connection: teachers and the National Grid for Learning*, Journal Computers & Education. Volume 33 Issue 4 1 December 1999: pp 235-252.

DEPARTMENT OF EDUCATION 1997: *Curriculum 2005: Specific outcomes, assessment criteria, range statements. Grades 1 to 9*. Pretoria: Government Printers.

DOCKTERMAN, DA 1991: *Cooperative learning and computers*. SIGCUE Outlook, 21 (2), pp. 39-43.

DWYER, CD; RINGSTAFF, C & SANDHOLTZ, JH 1991: *Changes in teachers' beliefs and practices in technology-rich classrooms*. Educational leadership, May 1991. p150.

FABRY, DL & HIGGS, JR 1997: *Barriers to the effective use of technology in education: current status*. Journal of Educational Computing Research 174, pp 385-395.

FISHER, C; DWYER, DD AND YOCAM, K (eds) 1996: *Education and technology: Reflections on computing in classrooms*. San Francisco: Jossey-Brass. p2.

FORCIER, RC 1999: The computer as educational tool: Productivity and Problem solving. (2nd edition). London. Merrill Prestice Hall. p 62.

GARDNER, BP 1994: Ensuring successful IT utilisation in developing countries. (In Alexander, PM 1995: Computer-Assisted Education and Training in Developing Countries: international conference 10-14 October 1994).

GROBLER, M 1995: Computer-supported cooperative education to support development in South Africa. Pretoria: Pretoria.University of Pretoria (D.Com, thesis). pp 90-101

HOOVER, S & HOKANSON, B 2000: The Changing face of knowledge. Social Education, Journal Social Education vol. 64 No 1 Jan/Febr. 2000: pp136-147.

JOHNSTON, M 2001: Assessing Technology Integration. Available from: http://www.suite101.c0m/article.cfm/technology_education/62905
(Assessed 26 February 2002)

KELLE, V 1997: Theory: Building in qualitative research. Sociological research online, vol 2, No. 2. <http://www.socresonline.org.uk/socresonline/2/2/1.html>
Accessed: 04 July 2002.

KENNEDY, IM 1995: Cooperative learning and computers: Understanding the Partnership. (In Alexander, PM 1994: Computer-Assisted Education and Training in Developing Countries: international conference 10-14 October 1994).

KILLEN, R 1998: Outcomes-based education: Some issues to consider in the South African context. A paper presented as an overview of OBE for a series of workshops presented at Vista University and ML Sultan Technikon as part of the AUSAID funded Australia – South Africa Institutional Links Project No. 2 – 7.

KREFTING, L 1991: Rigor in qualitative Research: The assessment of trustworthiness. The American Journal of Occupational Theory, vol 45,no. 3 of March 1991. pp 214-222.

KVALE, S 1983. The qualitative research interview: A phenomenological and a hermeneutical mode of understanding. *Journal of Phenomenological Psychology*. No. 14, 1983. pp 171-196.

LAMONT, AG 1994: Computer-Managed Instruction: Quality Education for the People. (In Alexander, PM 1994: Computer-Assisted Education and Training in Developing Countries: International Conference 10 – 14 October 1994).

LANCY, DF 1993: Qualitative research in education: An Introduction to the major traditions. New York. Longman. pp 45-68.

LIGHT, PH & MEVARECH, ZR 1992: Cooperative learning with computers: An Introduction. *Learning and Instruction*, 2 (3), pp155-159.

LIPPERT, RC 1993: Computer-based education and training in South Africa. Pretoria: J. C. van Schaiks. pp 5-13.

MAHOMED, AM 2001: Outcomes-based education – an overview. The Journal of the Gauteng Department of Education. Issue 6, January 2001. pp15-24.

MARTIN, CD 1991: Stakeholder perspectives on the implementation of micros in a school district. (In Blomeyer, RL jr & Martin, CD 1991: Case Studies in Computer Aided Learning. London: The Falmer Press. pp169-221).

MILLER, PA 1997: The integration of computers at Pinelands High School: A case study. Pretoria, University of Pretoria. (M.Ed, dissertation).

MORRISON, GR; LOWTHER, DL & DeMEULLE, L 1999: Integrating Computer Technology into the classroom. New Jersey. Merrill. pp 1.18-6.06.

NAIDU, E 2001: Using computers to learn. The Teacher, July 2001: p 9.

NORTON, P & SPRAGUE, D 2001: Technology for teaching. Boston: Allyn and Bacon. pp 37-42.

ORLIKOWSKI, WJ 1994: The Duality of technology: Rethinking the concept of technology in organizations. *Organization Science*, 3 (3): pp 398-427.

PANITZ, T 1996: A definition of collaborative v/s cooperative learning. Available from: <http://www.lgu.ac.uk/deliberations/collab.learning/panitz2.html>
(Assessed 09 October 2001).

PIETERS, JM 1990: Research on computer-based instruction. Amsterdam: Swets en Zeitlinger.

PIETERS, G 2001: The role of computer-based instruction in the effective teaching and learning of Maths, Science and Technology in elementary classrooms.
Available from: <http://fcis.oise.utoronto/~gpieters/1601/>
(Accessed 12 February 2002)

ROBLYER, MD; EDWARDS, J & HAVRILUK, MA 1999: Integrating Educational Technology into Teaching. New Jersey. Merrill. pp 212-219.

RUTKOWSKA, JC & CROOK, C 1987: Computers, cognition and development. New York: John Wiley & Sons. pp 67-89.

SELWYN, N 1998: The effect of using a home computer on students' educational use of IT. *Computers and Education* (31) 2 pp 211-227

SELWYN, N 2000: Researching computers and education-glimpses of the wider picture. *Computer and Education Journal*. Vol.34 issue 2 1 February 2000. pp 93-101.

SHELLY, GB; CASHMAN, T; GUNTER, RE & GUNTER, GA 1999: Integrating technology in the classroom (2nd edition) Thomson Learning: South Africa. pp 6-7.

SLAVIN, RE 1990: Cooperative learning: Theory, Research and Practice. Boston: Allyn and Bacon. pp 34-56.

SPADY, WG 1999: Curriculum 2005: a guide for parents. Cape Town: Renaissance.pp23-79.

STARR, L 2000: Education in the New Millennium. Available from Education World. <http://www.education-world.com/a>
(Accessed 19 March 2002).

STARR, L 2001: The administrator's role in technology integration. Available from: Education World. http://www.eduction-world.com/a_tech/tech087.shtml
(Accessed 19 March 2002).

STEINBERG, ER 1991: Teaching computers to teach. 2nd ed. New Jersey: Lawrence Erlbaum Associates Publishers. p 68.

TESCH, R 1990: Qualitative Research: Analysis types and software tools. New York: Falmer Press.pp 68-89.

VAN WEERT, 1994: The use of technology in education. (In Alexander, PM 1994: Computer-Assisted Education and Training in Developing Counties: International Conference 10 – 14 October 1994).

VORSTER, C 1995: Another view on computers in education. (Online) usenet: school.za, July 26, 1995.

YIN, R 1994: Case study research: Design and methods 2nd ed. Beverly Hills CA: Sage Publishing.pp 56-78.

ZORFASS, J 1991: A technology integration model for middle schools. T.H.E. Journal, September 1991. pp 49-57.

APPENDIX A

P.O. Box 332
Morula
0196

30 April 2002

The Principal

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Sir/Madam

ACADEMIC RESEARCH ON THE INTEGRATION OF COMPUTER-SUPPORTED COOPERATIVE LEARNING TO ENHANCE QUALITY LEARNING

I am a Masters degree student enrolled at RAU (MEd Computer-based Education) and I am currently undertaking research into the use of computers in educational settings in the Brits district.

More and more schools in the Brits District are acquiring computer systems, which are tools that may enhance quality learning. Effective integration of this modern equipment can change the learning approach and outcomes achieved.

This study will investigate how computer-supported cooperative learning has been integrated into selected schools in the education system and how this integration impacted on better learning.

I therefore request you to allow me to conduct the research in your institution by interviewing the educator in charge of the computer centre or computer education, at his/her most convenient time.

Data collected will be kept confidential and will be made available to all participants on request.

Should you require any additional information, feel free to contact me at: (012) 7020307; (012) 7036406 or 082 259 5921.

Your cooperation is greatly valued.

Yours faithfully

Ramotshabi Levy Tlhoaele

APPENDIX B

P.O. Box 332
Morula
0196

30 April 2002

The District Manager
Department of Education
Brits District Office
Private Bag X5082
Brits

Sir/Madam

ACADEMIC RESEARCH ON THE INTEGRATION OF COMPUTER-SUPPORTED COOPERATIVE LEARNING TO ENHANCE QUALITY LEARNING

I am a Masters degree student enrolled at RAU (MEd Computer-based Education) and I am currently undertaking research into the use of computers in educational settings in the Brits district.

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Yours faithfully

Ramotshabi Levy Tlhoale



Department of Education

APPENDIX C
Lefapha la Thuto

Departement van Onderwys

BRITS DISTRICT OFFICE
Private Bag X 5082
BRITS
0250

Tel no: (012) 2527080
Fax no: (012) 2520580

TO: Mr Ramotshabi Levy Tlhoale
P.O. Bx 332
MORULA

FROM: DISTRICT MANAGER.

SUBJECT APPLICATION FOR PERMISSION TO CONDUCT RESEARCH INTO
THE USE COMPUTERS IN EDUCATIONAL SETTING IN THE
BRITS DISTRICT

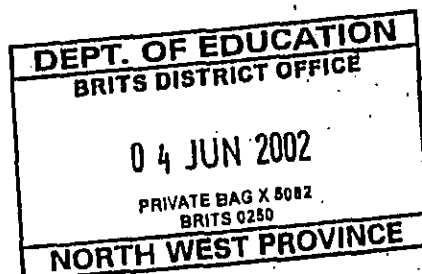
The District Manager acknowledges receipt of your application to conduct the above -
mentioned research work.

Permission is hereby granted to you to conduct the said research on condition that the normal
running of the school in not interfered with.

I hope you will find this arrangement in order

Yours Sincerely

DISTRICT MANAGER



INTERVIEWING INSTRUMENT

1. BASIC INFORMATION

1.1 Name of school:
1.2 Name of instructor/computer coordinator:
1.3 Location:
1.4 Enrolment:
1.5 Number of learners exposed to computer learning:

2. EDUCATOR'S COMPUTER COMPETENCE

2.1 Have you attended computer course(s)?	yes	no
2.2 Which of the following computer-aided instructions have you studied?		
2.2.1 Word Processing (Word, Word Perfect)		
2.2.2 Database/Spreadsheet (Excel)		
2.2.3 Electronic Presentation (PowerPoint or Persuasion)		
2.2.4 Internet Access (Research or Telecommunication)		
2.2.5 Access (Portfolio building)		
2.2.6 Desktop Publishing (Yearbook, Journalism, Newspaper)		
2.3 What is your highest computer qualification?		

3. COMPUTER AVAILABILITY

3.1 How many computers are there at your school?	
3.2 Where are they kept? (classroom/laboratory)	
3.3 For which programme/project are they used? (Choose from the options below)	
3.3.1 Computer Literacy	
3.3.2 Computer Science	
3.3.3 Computer aided instruction	
3.3.4 Computer-supported learning	
3.3.5 Computer-supported cooperative learning	

4. SUPPORT SYSTEM

4.1 How often are the computers serviced?	
4.2 Are they serviced by technicians?	
4.3 Do you have a maintenance plan?	
4.4 If yes, how do you fund the plan?	
4.5 Do you receive any support from the Department or District office?	
4.6 If yes, what type of support is provided?	

5. DOCUMENTS

5.1 Do you have school policy on computer integration?
5.2 How old is the policy?
5.3 How often is it revised?
5.4 Do you have Departmental or District policy on computer integration?

6. PROGRAMME OVERVIEW

6.1 Has computer-supported cooperative learning (CSCL) been introduced in your school?
6.2 Has CSCL been integrated into the school curriculum?
6.3 If yes, explain how it was integrated.

APPENDIX E**QUOTES FROM THE COMPUTER EDUCATOR AND LEARNERS****1. Educator's computer competence:**

Line 1 A:

"I have diploma in computer typing which I had to study whilst teaching because I only had Typing. Computer typing is more advanced than Typing."

Line 1 B:

"In computer literacy learners are taught Word Processing, Excel, Power-Point, Internet Access, Access and Desktop Publishing."

2. Computer programmes:

Line 2 A:

"I introduce something to them, then they work on the computer in groups the same as in OBE."

Line 2 B:

"Yes we offer some subjects through CSL and CSCL approaches."

3. Support system:

Line 3 A:

"I do not receive any support from the district. I feel I am the only one in the world. There is nobody to help me. I feel all alone"

4. Documents:

Line 4 A:

"Unfortunately we do not have school policy on integration."

Line 4 B:

"The syllabus is not available, but I am using two books which I found to be very helpful in Computyping and they are Computyping grade 12 by Eksteen, Snyman and Vys and Study Guide (G-12) by Guidelines Study Aids."

Line 4 C:

"Learning material for CSCL is prepared by individual teachers."

5. Integration of CSCL:

Line 5 A:

“I discuss with individual subject teachers sections which can be presented through CSCL approach, and assist in preparing learning material. I also give technical advice in the presentation.”

Line 5 B:

“We do not have a fix time-table because subject teachers are not coming regularly to the lab. Some come once a week.”

6 Experiences:

Line 6 A:

“My experiences are numerous. I am pleased with the progress that the learners had made. I am also grateful of my colleagues who are eager to learn from me.

Line 6 B:

“I am excited about my work because I derive lots of pleasure from it.

Line 6 C:

“To me work load is no longer an issue because I have more time to control learners’ work whilst they are learning in the classroom.”

Line 6 D:

“I am able to access learners’ assignments at home after hours.”

Line 6 E:

“My biggest challenge is to secure necessary documentation such as syllabus, policy, choosing suitable software material and developing learning material.

4.3.6 Learners’ responses:

1. Uses of computers at their school:

Line 7 A:

“We use computers for interacting with other learners, for doing assignments and posting them to the teacher.”

Line 7 B:

“We work together in pairs and discuss the work given to us.”

Line 7 C:

“We enjoy searching for information on the Internet when working on assignments and projects.”

Line 7 D:

“After school we learn computer skills such as drawing, and playing games even though we are not suppose to.”

Line 7 E:

“We enjoy learning because it is easier and fun.”

