

# Chapter 5

## Interpretation of data

### 5.1 Introduction

Chapter 5 interprets the data presented in Chapter 4. To do this, the researcher generalized the findings of the study sample to the whole population (WorLD participant teachers and learners). It is noted that the small sample size limited the generalisability of the study. Research findings and conclusions drawn are therefore grounded in the extensive literature review undertaken, which emphasises the context in which the study was conducted.

Interpretation entails an analysis of relevant literature and survey data, based upon the research questions that underpin the study. The questions, which are outlined in Chapter 1, are:

- How successful was the training provided to teachers and students in WorLD schools (in terms of enabling them to utilize computers for collaborative school projects)?
- What information resources (computer laboratories, Internet, libraries, multimedia centres) exist in the schools and do the schools have media teachers?
- To what extent are the WorLD teachers able to handle school projects, attend to computer systems and teach their normal school lessons?
- What is the literacy level of WorLD school pupils in terms of reading, accessing and using information in the English language?
- How far can multimedia fill the gap in the utilization of ICT in South African WorLD schools?
- What other factors contribute to the success or failure of the WorLD programme in South Africa?

Lundall and Howell<sup>37</sup> (2000: 2) state that several factors can determine the success or failure of ICT in schools. Some of these factors, which have been the basis of the present study, include networks of connectivity and structured and continuous programmes to train teachers to use the new technology for educational purposes. The two researchers add that ICT should be integrated, from the start, into the teaching and learning process and into the structures of administration and management. In the following section research questions are presented, analysed and compared with related literature.

## **5.2 How successful was the training provided to teachers and learners in WorLD schools (in terms of enabling them to utilize computers for collaborative school projects)?**

### **5.2.1 Training of teachers**

The training of teachers and learners was a key component of the WorLD programme. Training was important, as it provides not only knowledge, but also the hands-on skills that enable the computer user to meet the programme's objectives. Training was also important because 62 % of participating teachers and learners had never used a computer before the introduction of the programme to their school. Training is therefore a useful benchmark to evaluate the WorLD programme in South Africa.

The findings of this study show that all teachers involved in the WorLD programme were trained (Tables 4.4 and Figure 4.2) and had computers to practise on after training. Most teachers were trained satisfactorily in computer applications and collaborative school projects. The aspect of training found to be most satisfactory was Microsoft Word.

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<sup>37</sup> Lundall and Howell conducted one of the first most comprehensive studies on ICT in schools in South Africa. The project, entitled *Computers in Schools*, was conducted under the auspices of the Education Policy Unit of the University of the Western Cape and sponsored by the International Development Research Centre (IDRC).

Technical training of teachers, on the other hand, was found to be unsatisfactory. No teacher was trained in the UNIX operating system (Table 4.5 and Figure 4.3). This was a major drawback for the WorLD programme, because the e-mail system used during the programme is based on the UNIX operating system. There was a major need for effective technical training because most of the WorLD computers were refurbished and often non-functional, requiring constant maintenance. The majority of teachers (88%) stated that technical training was critical to be able to maintain the programme. A lack of effective technical training was therefore a serious flaw in the WorLD programme in South Africa. McGhee and Kozma (2001:5) support this finding, namely that, in South Africa, the variety of training support received by teachers was low and the South African national score on the teacher training benchmark was lower than the African and WorLD programme average.

It is noteworthy from this survey (Table 4.6) that many teachers embark on efforts to equip themselves with ICT training. The enthusiasm of the educators for taking private ICT courses bodes well for ICT education in schools in South Africa.

The lack of effective technical training, evidenced by the present study, suggests that teachers and learners will have to familiarise themselves with the technology, as observed by Goldman *et al.* (1999), before settling down to integrate technology with content. This means that the period of integrating ICT into education will take longer than previously expected. Schools may also have to resort to the following suggested solutions (Lundall and Howell 2000: 43), to keep their computer Networks functioning. The solutions include:

- outsourcing some of the work regarding computer networks;
- sharing technical staff with other schools in the area;
- combining certain roles such as technical support staff.

The recommended solutions are critical in situations such as the WorLD programme, where schools use refurbished computers, which often break down. It is also important for school managers using ICT to recognize that the best plans will remain unfulfilled if there is lack of communication between technical and educational functions.

### **5.2.2 Training of learners**

Training of learners has also not been satisfactory. Thirty-six per cent of WorLD learners were not trained at all and 40 per cent of those trained were not trained well enough (Figure 4.7). Learners spent less time being trained than their educators (Figure 4.5, Tables 4.7 and 4.8). Fifty-three per cent of learners were trained for less than three hours a day; all teachers were trained for three hours or more per day. No training was done in database systems or programming skills for learners or teachers (Figure 4.2 and 4.8), even though this had been stressed in the literature (Hawkridge, Jaworski and McMahon 1990:15 and Clyde 1997). No training regarding information skills was provided for learners, even though some teachers had been exposed to such training.

A number of writers (Addo 1999, 2001; Holland 1999; Clyde 1997; Hawkridge, Nahl and Harada 1996 and Kafai and Bates 1997) emphasized that training and skills development for learners are prerequisites for the utilization of computers in education. Clyde (1997: 48) states that to be able to use a computer for educational purposes one requires “the knowledge and skills which are related to the hardware, the system, the software, the information source.”

The findings of the present study show that not enough skill and confidence in using ICT was developed among learners. This is because only seven per cent of learners always had access to a computer to use for practice after training sessions. Thirty-six per cent of learners trained did not have access to computers to practise on after training.

One may argue that WorLD learners would receive continuous training as the programme progressed. The importance of mastering computer skills, stressed by Nahl and Harada (1996) and Kafai and Bates (1997), cannot be over-emphasised. It must also be noted that learners not skilled could be intimidated in their use of computers during the WorLD programme, as was observed by Holland (1999).

Learners would have performed better if they had been trained adequately. Nahl and Harada

(1996), for example, found that students who reported that they were more experienced in the use of computers performed significantly better than those with less experience. Kafai and Bates (1997) conclude that not only do students with more Internet experience dominate the computer interaction process, but those with more computer experience become the teachers of search teams. Nahl and Harada (1996: 203) advise that self-confidence, *which can only be attained through practice with computers*, is an important factor in an information search process.

Findings relating to the implications of lack of adequate learner training are supported by the conclusions of Addo (1999, 2001), in a research project carried out in areas in which some WorLD schools are located. The majority of learners could not use computers effectively for a schools' online environmental education project, because they had not attained the required computer and information retrieval competencies. Sagahyroom (1995), quoted in Addo (2001), states that in Kenya and other developing countries the quality of in-service training was crucial and more important than the nature of the hardware and software used in ICT utilization in education.

The findings of the present study draw a parallel with a similar one conducted by Bot (1999:7), namely that only ten per cent of learners always used computers for learning, and only six per cent of teachers always used the tool for teaching in schools where computers exist. It is hoped that the Educator Development Network online training, embarked upon by SchoolNet South Africa, will be able to provide the clear strategy regarding the training of teachers, and therefore learners, in previously unresourced schools, thereby integrating computers into the teaching and learning process in South Africa.

### **5.2.3 How far does the existing pedagogy in WorLD schools**

## **support computer-based teaching?**

This study has found that, apart from the project team and the research-based teaching methods, WorLD teachers are not familiar with, and do not use, teaching methods that support the use of ICT in education (Figure 4.4). It is also evident that, apart from the research-based teaching method introduced in some of the WorLD schools, teachers have not been trained in most of the methods for the implementation of the programme.

Researchers and writers such as O’Kennedy (1995); Johnson (1995); De Villiers (1998); Karaliotas (1997) & Govender (1999), made it clear that the utilization of ICT in education is possible only with certain teaching models. These models have been analysed in Chapter 2 (Section 2.3.2). The models are:

- the project-based teaching method;
- the student team method;
- the constructivist method;
- the research-based method;
- the system-based method;
- the authentic teaching method.

These models essentially place the learner in the position of initiating and taking charge of the learning process, while the teacher acts as facilitator, mediator or coach.

Bot (1999: 7) found that, in certain provinces of South Africa, only a few learners solve problems on their own, or participate in learning activities. She concludes that teaching methodologies in some provinces still rely on what is termed ‘chalk and talk’ and “it seems therefore that the methodology required to effect computer-based education, which requires active learner participation, has still a long way to go in its infusion into the education process in South Africa and this needs to be addressed” (Bot 1999: 7).

An evaluation of the WorLD programme in five countries (Chile, Paraguay, Peru, Senegal and Uganda) (Kozma *et al.*, 1999) found that the pedagogical approach was a novelty for

African schools that participated in the programme.

The present study establishes that the existing pedagogy in WorLD schools does not support computer-based teaching. This finding supports an earlier one of Govender (1999), who concludes that South African schoolteachers do not fully understand the concept of utilizing educational technology in schools. Efforts are being made by teachers themselves and the WorLD facilitators to develop the teaching models. Such efforts, though laudable, seem inadequate to address teachers' knowledge and skill gaps in ICT teaching models in South African schools. These findings show that full integration of ICT education into teaching and learning will take some time, not only in the WorLD programme but in other like projects.

According to Lundall and Howell (2000: 46), proponents of quality teacher training believe that it would have been ideal if teachers were trained during professional stages to appreciate the use of computers in their practice and acquire the necessary skills before entering the classroom. Demand on services requiring the use of ICT in schools in its nascent stage makes such training difficult. ICT training therefore seems to favour in-service training, where many teachers acquire only the basic skills, and a little confidence, before going into the class.

Teachers require training that integrates ICT into curricula to design courses that will convey both content and skills. Most importantly, teachers must be able to collaborate and work in teams, across job categories and, increasingly, across borders. Training in the use of ICT, therefore, has to be part of a much richer education for teachers and must address issues of pedagogy in the context of global curriculum change (Lundall and Howell 2000: 46).

The opinion of de Moura Castro (1999) is that developing countries will only reap the benefits of the ideal kind of training many years from now. While developing countries may not be able to afford the ICT priority afforded to teachers in developed countries, the need to include key components into professional in-service training and pre-teacher training is critical.

### **5.3 What information resources (computer laboratories,**

## **Internet, libraries, multimedia centres) exist in the schools and do the schools have media teachers?**

The present study (Figures 4.11, 4.12 and Table 4.14), shows that most WorLD schools have fewer than the minimum required information resources (computer networked laboratories, Internet access, libraries, multimedia centres) and media teachers necessary to effect computer-based education. It is also evident that the number of functioning computers at WorLD schools, software and, more importantly, the Internet access available during the project, makes it impossible for any effective collaborative projects to take place.

Other technologies, namely television, video, radio and overhead projectors, which support technology-based education, exist in most schools. Seven of the WorLD schools included in this study have computer laboratories. Three schools have media centres, two have media teacher/librarians and two have regular Internet access. None of the sampled schools has a multimedia centre or Network controller (Table 4.11). There is an average of 14 computers per school (Table 4.15). There is an average of five computers with CD-ROM drives (Table 4.16). A number of schools still have computers, with Windows 95 operating systems (Table 18), which Microsoft software vendors no longer support. While many schools have television sets, few schools have slide or data projectors (Figure 4.12). Evidence from this research shows that better-resourced schools often support under-resourced schools in South Africa.

Significantly, only two sampled schools (25%) have regular Internet access. This is



significant, because Internet access is a basic factor of the project, since the objective of the WorLD programme was collaborative online projects with other learners across the world. Also, in 60 per cent of the schools, only one computer was connected to the Internet. This is a serious hindrance for collaborative projects. In one of the schools, the researcher found that the computer connected to the Internet was located in the principal's office, which means that no collaborative project could take place in that school. It is also important to point out that most teachers (62%) do not use information from the Internet for education because the Internet was often unavailable. This finding is no different from the case of Mozambique, where McGhee & Kozma (2001) report that 65 per cent of teachers reported that the lack of Internet access was a major barrier to the implementation of the WorLD programme.

Many authors (Liddell, Masilela, Rapodile & Strydom 1990; Radebe 1997; Gordon 1997, Todd 1997; SAIDE 1998; World Bank 1999 & Addo 1999) state that an adequate school resource environment, with the appropriate logistics, infrastructure and personnel, is a *sine qua non* for good-quality ICT education. A study by the World Bank (Liddell, Masilela, Rapodile & Strydom 1990) suggests that the provision of good educational material is the most cost-effective way of improving educational quality. Addo (1999: 86) found that the adequacy of infrastructure and logistics in schools is conditional to the availability and use of ICT for education. Important elements for utilizing ICT in education are a school computer laboratory, a school library, a school librarian/media teacher, electricity, a telephone and security against theft.

The situation in South Africa (which is gradually improving, as shown by Tables 2.3 and 2.4) is, according to Gordon (1997: 40), schools without walls, teachers without teaching skills

and full knowledge of the subjects they teach, and the need for students to read, write and reason. This has prompted Radebe (1997: 224) to suggest, correctly, that computers did not feature as a factor in education in South Africa. Lundall and Howell (2000: 157) recommend that technologies in education should not be viewed in isolation, but rather seen from the broader societal distribution of resources. Bot (1999:3) observed that, in South Africa, roughly six out of every ten teachers said that a lack of teaching materials considerably limited their teaching. This lack had a serious effect on the morale of teachers nationally.

#### **5.4 To what extent are the WorLD teachers able to handle school projects, attend to computer systems and teach their normal school lessons?**

All teachers participating in the WorLD programme were trained to provide ICT education. The present study found that not only were the teachers adequately trained but they rated themselves highly, in terms of ability and confidence. Conversely, however, the study revealed that there was not enough time to utilize the skills acquired in WorLD schools. The teachers rated themselves very low in terms of time to discharge activities relating to WorLD programmes (Tables 4.20 & 4.21).

Unavailability of time to deliver on WorLD programmes is further shown by the fact that 88% of teachers indicated that their involvement in the programme had affected their teaching duties. The feature of unavailability of time to deliver on WorLD programmes is

also reported in other WorLD countries on the African continent by a WorLD country report (McGhee and Kozma 2001). The report submitted that, in Ghana, more than half (54%) of the teachers reported that a lack of time to implement WorLD programmes, given school curriculum requirements and the limited school day, was a major barrier. Similar sentiments relating to lack of time were reported by teachers from almost all the other WorLD countries in Africa, namely Mauritania, South Africa, Senegal and Uganda. A similar finding was made by Tshenye and Perold (2000:15), in reviewing other School ICT projects, in the Eastern Cape and the Northern Province of South Africa, as evidenced in the literature review of this study. Lack of time to deliver on WorLD programmes is further corroborated by a study of the WorLD programme in Chile, Paraguay, Peru, Senegal and Uganda. Kozma *et al.* (1999) found that a large number of teachers mentioned the difficulty of finding time for computer-related activities in their schools.

The effect of the WorLD programme on teachers' normal duties in South Africa is exacerbated by the fact that only minimum support was provided to teachers, not only technically but, worst of all, by the schools' principals, many of whom were ignorant of the programme and the role of ICT in education. Bot (1999:6) confirms teachers' perception of principals as lacking knowledge, and therefore not supporting school ICT projects, in that more than half of the principals lacked the capacity to support their staff.

With the lack of time to deliver on WorLD programmes and their effect on teachers, one would have thought that support from various sources would raise the morale of teachers who were not paid to undertake ICT projects in their schools. More often than not, school ICT projects marginalize the school librarian, who is a critical personnel resource in the integration of any form of information technology into the curriculum. The role of the school library in the WorLD ICT resource model testifies to the crucial role of the school librarian.

According to Lundall and Howell (2000: 44), teachers often do not know what they can do with technology. The tendency was to use ICT simply to automate traditional teaching methods. The need for support to provide a resource base to guide teachers is a critical factor and also for an advisor, who can facilitate group work among teachers so that there is a

sharing of experience and, it is hoped, collaboration around projects. Lundall and Howell (2000) maintain that such practice was prevalent in the developed countries of the United States of America and Britain. They indicate that the process involved the training of **Master Trainers**, who then serve as resources for their colleagues. Lundall and Howell (2000:44) stress that such expertise could be from other staff, such as librarians and computer co-ordinators, or from volunteers from business, the parent body or student groups. In reality it is often these support people, rather than teachers, who supervise the students.

O' Kennedy (1995:7) was correct in his observation that teachers who man computer systems were already overloaded with work and the additional load of being Network manager would be too much to cope with. Maintaining a computer network in a school is an expensive undertaking and it requires a full-time job position.

## **5.5 What is the literacy level of WorLD school pupils in terms of reading, accessing and using information in the English language?**

It is evident from the present study that the majority of learners (62%) are able to read (that is, access content in books) and write without assistance (Table 4.28). The study reveals, however, that where reading problems exist, close to two-thirds of learners experience acute reading problems, ranging from 50 to 90% (Figure 4.16). The study also shows that only 12% of learners could access information from the Internet without assistance and only about half of learners could read from the Internet.

Learners' inability to read and access information from the Internet has been attributed to lack of resources at home and at school (Table 4.28). The use of the local language as a means of instruction and communication also plays a significant role in limiting reading and accessing of information which is primarily in the English language (Table 4.28).

Lack of information skills is a major likely reason for the inability to access information from the Internet. This is because no learner has been trained in information skills (Figure 4.8).

The non-involvement of the school librarian in the project in schools contributes, in no uncertain terms, to the lack of information skills. It is noted that 89% of learners do not have a computer at home and 80% of those who have, indicate that the computers are not

connected to the Internet. It is therefore not surprising that nearly half, or 47%, of the learners did not use a computer for class exercises during the programme (Table 4.38) and 35% have not been involved in any collaborative project (Table 4.39).

Available literature (Blacquiere 1989; Macdonald 1990; Radebe 1994, 1997; Bouwer 1998) corroborates frustrations experienced by learners in this study about using the English language as a second language for education. The literature not only dwells on the causes, which in many instances are the non-availability of resources at learners' homes and at schools, but it elaborates on the related consequent effects on learners' studies.

Heugh, Siegruhn & Plludelemann (1995:46) and NEPI (1992:72) have made it clear that in a situation where a learner's home language is not the language of learning in a school, the phenomenon of language-cum-cognitive difficulty exacerbates existing learning difficulties. Bouwer (1998:226) notes that research demonstrates that it is virtually crippling to grapple with content in a language inadequately understood, or mastered at the lower competence level of basic interactive communication skills.

The school resource situation, especially library provision (Table 2.3), corroborated in this study by Figures 4.10 and 4.11, justifies the views of Radebe (1997), that where libraries do not exist in schools for pupils to read in the language of instruction, their grasping of content in non-mother-tongue languages is impeded.

This study exposes the lack of resources at learners' homes and the absence of the culture of literacy in many black African families. This creates problems for learners, with parents and guardians unable to assist, as indicated by Bouwer (1998: 226). This situation, according to Blacquiere (1989) and Radebe (1994), manifests itself in many such students' lack of critical thinking skills, even at higher education levels in South Africa.

While Blacquiere (1989:78) concludes that black students at tertiary institutions were unable to read as efficiently as their white peers because they were intellectually malnourished, Radebe (1994:43) found that, in almost all tertiary institutions, the most noticeable concern in students' inadequacies in terms of their preparedness was information illiteracy, which was along racial lines. Both writers attribute the problems to the lack of reading resources in the schools. Many black learners in South Africa no doubt view as incapacitating their poorly developed skills in the language they use for learning (Macdonald 1990:48-49).

This research has shown (Figure 4.16) that the inability of pupils to retrieve information from computers in the WorLD programme is not only a result of scarce reading resource provision but also of lack of information skills. It is logical that if as many as 62% of learners (Table 4.25) can read without assistance, but only 12% can retrieve information from the Internet without assistance (Table 4.27), a possible reason for the low information retrieval situation is lack of information skills.

Accessing content in an information retrieval system is not the only drawback of information seekers who use information retrieval systems which use their second language. Information retrieval performed in the information seeker's second language raises relevant issues such as command of the computer language, command of keywords, the level of education and the level of experience, all of which are lacking among many teachers and learners in schools in South Africa (Radebe 1994).

Nahl and Harada (1996:199) point out that, students often use natural language, which is not compatible with the online catalogue's controlled language. This situation could be a problem for many learners due to lack of information skills. In the present study only 12% of WorLD learners were able to retrieve information from computers without assistance.

A study by Large *et al.*, (1994:500) concluded that retrieving information from all databases involves some cognitive activity. These activities are alluded to in section 2.3.4 of the

literature survey of the present study and dovetail with the conclusions of Large *et al.*, (1994:500), namely that the process of information retrieval is affected by personal characteristics such as knowledge, experience, information need and the information system being used. These are attributes which are lacking in many schools in South Africa because of the non-provision of information skills in many schools, as has been established by the present study. Radebe (1994:43) raised the concern that, in many tertiary institutions in South Africa, a noticeable concern in students' preparedness was information illiteracy.

Findings of the famous Schools' Network Action Project, dubbed the SNAP-Dragon project of the University of California Los Angeles (UCLA) by Kafai and Bates (1997), are still valid today. Conclusions from the research are that, though the Internet supported free text, students were not able to select good sites for their projects because they used the titles of their project to decide on the sites from which they wanted to retrieve information, instead of keywords. It was also found in the SNAP-Dragon study that using rudiments of Boolean logic enhanced the search skills of students.

The essence of information skills in this study brings into focus the role of the media teacher, presented in section 2.4.3 of the literature survey of this study. According to Kafai and Bates (1997), the success of the SNAP-Dragon project was due to the role played by skilled Library and Information Science (LIS) Interns, who acted as *de facto* librarians during the project. Silva (1995:243) noted that librarians have been key resources in the introduction and success of Internet classroom activities and have been resource persons offering advice, instruction and even technical support to teachers. The number of WorLD schools with media teachers/librarians (Figure 4.9) does not favour the expected role of media teachers in the

project in South Africa. It was not surprising that teachers, many of whom had not used school libraries in the past and were unaware of their functions, were undecided about the qualifications of the additional staff member - whether he or she should be a librarian or a purely technical person each received a 50% response.

This researcher agrees with concerned teachers that, as previously disadvantaged schools and pupils cannot immediately escape the legacy of past educational policies, scars still exist in terms of infrastructure, logistics and the know-how of teachers, which reflect the abilities of students in schools. Such students lack the foundation and resources to undertake rigorous computer-based education. Where the Internet content is not yet available in the local language for easy access, an alternative computer system is required to provide further motivation and to address the problems of illiteracy, inadequate teacher training and low learner motivation found in the WorLD and many other schools in South Africa. Such a system, as suggested by concerned WorLD teachers in KwaZulu-Natal, should be one of computer-based multimedia.

## **5.6 How far can multimedia fill the gap in the utilization of ICT in South African WorLD schools?**

This study shows that 40% of WorLD teachers have used a multimedia computer system before. Of the 40%, half have used a combination of text, sound and image. Many of the teachers responded positively to the means by which multimedia can assist in ICT education. The largest response (75%) believes that multimedia will stimulate the learning process of students (Table 4.30)



A number of authors (Gates 1994; Spranger 1997; Malapile 1996; and de Horowitz 1993) share the response of the majority of WorLD teachers, namely that multimedia has a positive role in ICT education. While Malapile writes from a black African setting that utilization of multimedia will help rekindle in learners the curiosity and the quest for knowledge, Gates (1994:170) observes that multimedia stimulates all learning paths by offering information through pictures, written text, sound animation and video. Many of the teachers (62%) indicated that multimedia will attract students to practise and acquire skills. This, the researcher believes, should be a tonic for the WorLD programme. As the majority of learners (82%) have television sets at home and over half (52%) view television very often, it is certain that a multimedia system will attract learners to ICT-facilitated learning. This is reinforced by the fact that 38% of the learners indicated that they prefer sound as an additional medium in using a computer for learning.

Edelstein (1995:44) emphasises the fact that multimedia products are expensive. Download time, which is the time taken to convert the data in computer format to information accessible to the user, can be frustratingly long, depending upon the quality of the equipment being used (DiNucci, Giudice and Stiles 1998:24). Edelstein (1995:44) categorised a set of the minimum equipment requirements to determine the applicability of a multimedia system.

The present study has found that no WorLD school has all the minimum requirements to utilise multimedia (Figure 4.16.). The majority of teachers (66%) have, however, indicated that with the skills they have acquired they will be able to utilise multimedia for teaching purposes. Teachers who feel they cannot utilise multimedia for educational purposes indicated that they will require further training in technical skills that relate to multimedia.

## **5.7 What other factors contribute to the success or failure of the WorLD programme in South Africa?**

### **5.7.1 Success of the WorLD programme**

The World Links for Development (WorLD) Programme is one of the flagship projects of SchoolNet South Africa. The organization is engaged in bridging the gap between policy and the implementation of ICT education in South Africa. It is also addressing the equitable utilization of ICT for teaching and learning as one of its objectives. The WorLD programme therefore focused solely on the previously non-resourced schools, which had never used computers for education.

Sixty-two percent of the teachers (Table 4.32) felt that the programme had equipped them with computer and information skills, which, according to Clyde (1997:48), are the skills required for living beyond mere survival in an information economy. Half of the teachers felt that the programme had not only introduced new insights into education for them but enabled them to develop themselves as far as new approaches to education were concerned. Teachers reported similar comments across the African continent, according to McGhee and Kozma (2001).

Almost two-thirds of teachers (62%) felt that the school had provided learners with skills which they will utilize in work situations and further education. Lundall and Howell (2000: 92) found similar sentiments with the majority of teachers. In effect, enthusiasm of the teachers in applying ICT to education related only to the social and direct benefits to teachers and learners in the previously non-resourced areas in South Africa. The issue of integrating ICT into education has yet to catch up with learners and teachers.

Thirty-one percent of learners indicated that the computer was a tool that aids the learning process. Twenty-one percent felt that it provided access to much information and 15% indicated that it was a tool that provided fun during the learning process (Table 4.40) Sixty-eight percent felt that there was a need to introduce the study of computer programming in order to derive the full benefits of learning with computers

### **5.7.2 Challenges facing the WorLD programme in South Africa**

The WorLD programme presented a number of challenges, which in certain cases could have contributed to a near failure to achieve the programme's objectives in South Africa.

#### *5.7.2.1 Training*

Training of teachers and learners was a key component of the WorLD programme. Although teachers were adequately trained, transfer of knowledge and skills to learners who required such knowledge and skills to make effective project objectives could not take place, because of lack of capacity in terms of time. It was not surprising that the majority of teachers indicated that the programme had provided them with more work and added responsibility. Many said that the programme had caused conflict between them and their school principals.

#### *5.7.2.2 Access to computers and Internet Connectivity*

The present study found that access to working computers was a major problem. An average of only 14 working computers to a WorLD school is considered a limited number. The study shows that as many as 33 learners on average per school (Table 3.3) took part in the project, which means that there were more than two learners to a computer. Lack of adequate hardware was reported as a major barrier to the WorLD programme in the South African Country Report (McGhee and Kozma: 2001). In addition to the number of persons per computer and inadequacy of hardware was the question of Internet availability, which was only 25%.

Half of the teachers suggested that the provision of more and better computer equipment and more and better technical training would improve the use of computers for education in the WorLD programme (Table 4.37). This reinforces the point made earlier concerning refurbished computers.

Sixty-nine percent of learners (Table 4.42) believe that the introduction of computer studies as a subject in schools will help improve the rate of utilization of the computer as a learning tool and hence improve the WorLD programme. It is supposed that the introduction of computer studies will make provision for a dedicated teacher and capacity in terms of time and personnel for computer-related subjects and issues, not only in WorLD schools but also in the future integration of ICT in education in South Africa.

### 5.7.2.3 *Cost*

Cost was not investigated in this study. It was, however, an issue that impinged on the immediate utilization and sustainability of the programme. Half (50%) of the teachers indicated that the programme was an expensive venture to be undertaken. Sixty-two percent of them concluded that the cost of maintaining the computer system may be out of the reach of the school in the future. Telephone costs were reported as a major barrier to the implementation of the WorLD programme in Senegal.

Lundall and Howell (2000) point out that cost, and particularly the cost of Internet access, has been cited as the most important factor for limiting Internet use in schools in South Africa. Table 4.36 draws attention to cost as an important phenomenon. As pointed out in James (2001:105), the non-availability of financial sustainability models in “soft” funding projects from grants provided by funding agencies render the medium- to long-term future of projects very fragile and with limited social impact. In this case evidence suggests that financial problems were visible in the short-term period of the project.

## **5.8 Summary**

Chapter 5 provided a detailed analysis of the research data and literature available to determine the findings of the study. The study established that, whereas WorLD teachers were adequately trained to deliver ICT education, technical and learner training was not adequate. It was also established that the existing pedagogy, as well as existing information resources in WorLD schools, do not support ICT education. The study found that, in spite of adequate teacher training, there was not enough time to implement the skills gained by teachers in the WorLD programme.

Learners did not experience problems with reading or accessing content in WorLD schools. Nevertheless, they were unable to access information from computers for collaborative projects because they lacked the skills to do so. While multimedia can be used effectively to

enhance ICT education, most schools do not have the required equipment to use multimedia.

Finally, although the cost of computer systems was not a feature of this study, it was observed as a major factor in utilizing ICT in the WorLD programme. The project may not be sustained if the cost factor is not given attention and resolved.