

THE IN-SERVICE DEVELOPMENT OF PRIMARY SCHOOL TEACHERS
IN THE USE OF COMPUTERS IN EDUCATION WITH SPECIAL
REFERENCE TO COMPUTER ASSISTED LEARNING: A case study.

Submitted in partial fulfilment of the
requirements for the degree of
MASTER OF EDUCATION (Computers in Education)
of Rhodes University

by

JOHN CHARLES MURRAY

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ABSTRACT

Many white primary schools in South Africa have acquired computers which are being used in various ways. In my experience few members of staff are confident enough to use the computers in the school for educational purposes. Those who have been using them, generally have been doing computer literacy. The teachers in our school expressed the view that they would like to be able to use the computer, but that they lack the necessary skills and therefore would welcome some form of training.

In my opinion computers should form an integral part of a child's learning environment. It has, for some time formed a part of his social environment, either in the home or in the workplace.

For computers to be used effectively in the classroom, it follows that the teachers need to be trained to use them. In an attempt to overcome this problem, I designed and presented an in-service course, which used selected computer assisted learning (CAL) programs with teachers. These teachers then used these programs with the pupils in their class and evaluated the pupils' reactions to the innovation.

As a result of the observations and the feedback provided by the sample of teachers, it is suggested that this might be a possible approach to in-service training for other schools. With adaptation it should be possible to follow this approach in any school which has a computer and someone on the staff who is willing to take the initiative to implement such an innovation.

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CHAPTER ONE

INTRODUCTION

Jones (1980:18) states the following about introducing computers to primary school classrooms:

I believe that the primary school is the right place to begin the use of this revolutionary tool. Before this can be done, it is vital that teachers see the importance and relevance of why they are taking on yet another new skill; they need to see why they need to adapt to meet the challenges of the changing world which is all around them.

I believe that this statement is also applicable to South African schools which are similar to the one in which I find myself at present, namely a white government school.

My approach to in-service training was one in which an individual school determined whether it could afford computers or not. It was not based on all schools having computers with a set syllabus, although the approach used in this research could be adapted for any primary school.

The problem which I experienced at the school was that no attempt had been made to show the teachers how to use the computer in the classroom.

The intention of this case study was to develop an in-service programme which would assist the teachers to use the computer in the classroom. It is possibly one of many approaches that could be used, but it was designed to meet the needs of the teachers in a specific school.

In this case study the method of action research was employed. Cohen and Manion (1980:174) define this type of research as follows:

Action research is a small-scale intervention in the functioning of the real world and a close examination of the effects of such an intervention. It is participatory and self-evaluative. It interprets the scientific method loosely and its focus is a specific problem in a specific setting.

The main objective of the course was to train a sample of teachers to use the computer in the classroom for educational purposes especially in the role of computer assisted learning (CAL) which Rushby (1984:25) describes as follows:

Computer assisted learning is the process whereby the learning material is presented to the learner through the computer. In this way the learner receives some detailed tuition from the computer.

Research done by Wayth (1983) and Bell & Scott (1985) has shown that CAL is an effective aid to learning and I wanted to develop

an approach which would assist the teachers in our school to experience the benefits which a computer could have in the classroom.

In CAL the learning material is presented to the learner through the computer. Jones (1980) describes CAL in the following way:

CAL is a learner-oriented application of the computer. It involves the use, and potential use, of computers with individuals and small groups where the emphasis is on the learner. That the learner is actively involved in the whole process is important, he is not a passive receptacle to be filled with knowledge, and to this end the computer and CAL programs are found to be effective.

Taylor in Siegel (1986:70) distinguishes between the following roles the computer can play when using it for CAL:

1.1 THE COMPUTER AS TUTOR

To function as a tutor in some subject, the computer must be programmed by "experts" in programming and in that subject. The pupil is then tutored by the computer executing the program. The computer presents some subject material, the student responds, the computer evaluates the response, and, from the results of the evaluation, determines what to present next. At its best, the computer tutor keeps complete records on each pupil being tutored; it has at its disposal a wide range of subject detail it can

present; and it has an extensive and flexible way to test and then lead the pupil through the material. With appropriately well-designed software, the computer tutor can easily and swiftly tailor its presentation to accommodate a wide range of pupil differences.

1.2 THE COMPUTER AS A TOOL

To function as a tool, the classroom computer need only have some useful capability programmed into it such as statistical analysis, super calculation or word processing. Pupils can then use it to help them in a variety of subjects. For example, they might use it as a calculator in mathematics and various science assignments, as a map-making tool in geography, as a facile, tireless performer in music, or as a text editor and copyist in English.

1.3 THE COMPUTER AS TUTEE

To use the computer as tutee is to tutor the computer; for that, the student or teacher doing the tutoring must learn to program, to talk to the computer in a language it understands. The benefits are several. First, because you cannot teach what you do not understand, the human tutor will learn what he or she is trying to teach the computer. Second, by trying to realize broad teaching goals through software constructed from the narrow capabilities of computer logic, the human tutor of the computer

will learn something both about how computers work and how his or her own thinking works. Third, because no expensive predesigned tutor software is necessary, no time is lost searching for such software and no money spent acquiring it.

Which is best: tutor, tool or tutee? I believe that they all have a role to play, but because of the limited nature of this research, I was only able to concentrate on one of the roles, namely that of tutor. Future in-service training courses might also include the other roles.

The views presented in this thesis are based on a review of literature and an empirical study of an in-service training course for teachers using selected CAL programs in the classroom.

It is important to bear in mind that the trainer was a teacher just like all the other teachers in the school. He had all the normal responsibilities and was given no additional free time to conduct the in-service training course.

1.4 STATEMENT OF THE PROBLEM

Our school possessed nine computers which were being used to a limited extent for computer literacy courses. The full potential of the computer was not being developed because the teachers were

not able to operate them.

It was therefore my intention to develop an in-service training course to assist teachers to acquire the confidence and ability to use the computer in the classroom in the tutor mode. The course was to have a practical approach which would cater for the needs of each individual teacher.

The approach was one in which the teachers used the computer in the classroom while the course was in progress and not one of first doing the complete course and only then going to the classroom.

Throughout the case study teachers would be required to provide feedback by way of questionnaires and interviews.

CHAPTER TWO

ISSUES RELATED TO INNOVATION2.1 BACKGROUND TO THE RESEARCH

I am giving some background information as to how I became involved with computers and how they were introduced into the schools where I have taught because it would seem that there are many schools who find themselves in a similar situation or might be in a similar situation in the future.

At my first school the computer innovation took place in a haphazard and unstructured manner. A programmer approached the staff and offered to write administrative programs - everything relating to the reports and the finances of the school. The school purchased two cassette-driven and one disk-driven BBC computer. These computers generated much interest among staff members after a demonstration was given. That was as far as it went. This was to be expected as the principal realised the need for computers but seldom expressed much enthusiasm and no staff member had had any prior experience in the field of computers. (See Appendix E for a more detailed description of the approach taken at my first school).

During my involvement with computers, it became clear that if a

school intended to use computers, it needed to formulate a structured plan. The staff needed to be aware of the programme so that they felt involved. The question of in-service training ought to be included in the planning as this formed a vital part of the whole process of using computers in the school.

At the school where I am at present, I was, having learnt from previous experience, able to adopt a more structured approach.

I informed the headmaster about what I intended to do. He gave me his full support and left me to continue as planned.

I selected up to three teachers per computer and then set to work. Details of the course can be found in chapter 5.

2.2 INNOVATION: SOME ISSUES

From my experience, it was clear that computers are, to many primary school teachers, an innovation. It was necessary therefore to look at aspects surrounding the computer innovation before attempting the in-service training of teachers in the use of educational computing.

Morrish (1976:20) defines innovations as follows:

Innovations can be assessed only in relation

to the aims and objectives of any particular school policy. A successful innovation in one system may prove to be unsuccessful if introduced into another. Innovation is the creative selection, organization and utilization of human and material resources in new and unique ways which will result in the attainment of a higher level of achievement for the defined goals and objectives.

Morrish continues:

The many failures in the history of education resulting from the introduction and transfer of successful innovations from one country to another, one society to another, or even one school to another, should make us aware that even 'successful' innovations are not intrinsically good but depend upon a multiplicity and variety of contextual factors and relations.

This supported my view that it was not possible merely to adopt what had been done in the United States of America and the United Kingdom, into my school. The needs in our school and possibly in other primary schools are in many cases different to their needs.

I agree with Urwick (1963:1) who said:

To manage innovations effectively implies elements of planning, control, direction and order. Management has been analysed as involving the activities of planning, regulating, commanding, coordinating, controlling and evaluating. The alternative to effective management of innovation is likely to result in a waste of time, money

and effort and the possibility of a poorer quality of education because the desired improvement does not become a reality. Clearly, at a time of severe financial restrictions, when the most efficient use of human and material resources is essential, and at a time of increased concern about the quality of education, it becomes particularly important that those wishing to introduce computers into education should do so as effectively as possible.

2.3 THE ROLE OF THE HEADMASTER

An aspect of innovation that is often overlooked is the role of the headmaster.

I agree with Hoyle (1974:47) who maintained that the headmaster was not only able to initiate innovation himself but his support was needed by an individual or group of teachers who wished to introduce computers.

MacDonald & Rudduck (1971:47) stated that the headmaster was a key figure, someone who was sensitive to the tensions that invariably arose in the process of innovation, and who could provide support for the innovating teacher.

The situation in many South African primary schools at present is that headmasters do not have much knowledge of computers. They therefore need to have confidence in the individual teacher

who wanted to introduce computers into the school and who wanted to play a leading role in the in-service training programme in the school.

What was needed in this case study was not an autocratic headmaster but one who was willing to delegate this responsibility to the relevant teacher. In this respect my headmaster gave me all the support I needed. I was given a free hand to do my research because he saw this as something which would in the long run be beneficial to the whole school.

The headmaster and I agreed that the long-term objective at our school was to put a computer into every classroom for CAL purposes. This would be an unfamiliar situation for the teachers and it followed that it would be essential to train the teachers so that they would be able to use them effectively. The teachers would be shown how to select software, how to organise and plan their teaching and how to utilize the facilities which they had at their disposal, in a productive way. The course would incorporate working together with a sharing of ideas so that the teachers would realise that they were not on their own but that it was a cooperative effort.

It seemed sensible that the course be conducted in a well-planned

manner with continual evaluation by the teachers. It was also important that the teachers gave their honest opinion regarding their evaluation of the course so that the school did not purchase computers which would not be used. The teachers were informed that they would be asked to give the headmaster feedback on the course to assist him in making a decision about future plans for computer usage.

2.4 COMPUTER ASSISTED LEARNING MODE

A variety of approaches and uses for the computer in the classroom exist. The important thing is that the computer in education must provide more effective teaching and learning.

The following will support my reason for selecting CAL for my in-service training:

2.4.1 Individualization

The pupil can learn in his own time, at his own pace and at his own level. The pupil can practise on his own, he can revise and he can repeat the exercise as often as he wishes. The sensitive pupil can develop his self-confidence. The computer has the ability to provide information, ask questions, analyse answers and provide appropriate comments. The teacher has more time to plan, to discuss progress with the pupil, to motivate and to provide

individual attention.

2.4.2 Interaction

The computer compels a pupil to participate actively in the learning process rather than merely be a passive listener.

2.4.3 Creativity

The computer can provide powerful graphics which combine colour, sound and movement to stimulate abstract thoughts and spacial orientation.

2.4.4 Problem-solving

By confronting the pupil with a problem, the computer can assist the pupil to make decisions and to test them. The pupil can experience what effect different variables can have on a specific situation. The pupil manipulates information, the computer processes it and provides comments. This exercise promotes cognitive thinking, decision making and analytical abilities. The pupil can use existing knowledge and apply it to new situations.

2.4.5 Motivation

Programs have the ability to make learning an enjoyable experience. They can change attitudes towards learning. The pupil can practise when he wants to, he can change variables and

will be provided with immediate answers. The pupil is actively involved in the learning process.

2.4.6 Immediate feedback

The computer provides immediate feedback and is objective in its comments. The computer never becomes tired or impatient. The computer can refer pupils to other references relating to a specific subject.

The evidence above suggests that computer assisted learning can be effective in the classroom and that it is important that the teachers in our school are trained to use the computer in this mode. The limited scale of the research is unlikely to cater for all of the above-mentioned assets of using the computer for CAL purposes.

CHAPTER THREE

A REVIEW3.1 TEACHER PERCEPTIONS OF COMPUTERS IN EDUCATION : AN INITIAL SURVEY

By way of informal interviews I asked teachers for their opinions regarding certain questions about computers. I could then refer to some of these questions after the in-service training course in order to determine the value of the course.

The teachers with whom I worked had different views about the role which computers could play in education. One must bear in mind that these teachers had had very little, if any, experience of computers in education.

The teachers agreed that the computer could be used effectively for administrative purposes. The school was not yet using the computer for this purpose, but neighbouring schools were. They were impressed with the computer's ability to handle such vast amounts of data with such speed and accuracy. They were in support of the use of the computer in this area which catered for reports, schedules, addresses and pupil particulars since they realised that they would have more time on hand for teaching and preparation while the computer carried out laborious

administrative tasks. They also felt that it gave a more professional touch to official documents, such as pupil reports. The teachers expressed their willingness to feed in the details themselves if shown how to do so. In my opinion this was an area in which in-service training would also be necessary. They did express their concern as to the confidentiality of and access to personal data, and the possible abuse of power in this area because of computer storage of such data. As this does not relate directly to my field of research, I shall not elaborate any further.

The survey showed that the teachers saw the computer as a helpful aid for drawing up examination papers. This was another area where one could begin to get teachers involved with computers. Some teachers have expressed their eagerness to attend a course on word-processing.

Further opinions that emerged were that children needed to be computer literate and they felt that as society was advancing rapidly in the use of computers it was essential that the children in the school should not lag behind.

Those who felt that it was unnecessary for primary schools to teach pupils computer literacy (learning about computers), argued

that this would be done in their later studies or in their job situations.

The teachers, despite having attended an in-service training course in computer literacy, still felt inadequately prepared to use the computer for the purposes of education. The main reason expressed by them for this lack of confidence was the fact that after having attended the course they were left to themselves without any support, encouragement or follow-up. In my opinion this was vital and I will be referring to it throughout this write-up. Two of the teachers felt that they were hesitant to become involved. They agreed with Bliss et al. (1986:54) who stated that the computer could easily be misused and end-up just another educational gimmick. This could also arise if according to Callison (1985:46) computers are installed in a school without a specific purpose. They were then often misused and could become toys for running game after game.

During the survey few teachers referred to CAL (learning with computers) simply because they were not aware of it. Those who had some knowledge of CAL expressed worries about class control especially with groups who could damage the computers. The others felt that this should not be a concern if the computer broke while being used for CAL purposes. They were also concerned that their

role as an imparter of knowledge might be challenged and that changes in their position of authority might arise. The computer in the classroom would involve new and different skills in classroom management and this could challenge their traditional discipline especially when working with pupils who were extremely proficient in the use of the computer.

They also felt that this change of roles may necessitate changes in the composition and size of the classes thus requiring a change in the amount of computer facilities and ultimately leading to a change in the organization of the school.

Some teachers felt that their lack of creativity would inhibit them to use the computer effectively and therefore felt that the best results would probably be achieved if they continued as before.

There was also a constant worry about the amount of commitment required in terms of time and energy in order to feel confident in this area. This is an acceptable fear raised by the teachers, but one which will hopefully be eliminated once the teachers have progressed through the in-service programme.

Four of the teachers felt that computers were cold and impersonal.

They wanted warm, personal relationships with their pupils and were not prepared to forfeit close interaction with their pupils in order to gain the advantage that microcomputers might offer.

The teachers did not think they would be replaced by a computer, but expected that their role with pupils would change as they learned to communicate with the machines. Billings (1981:87) states that some people envisage the gradual disappearance of books and the absence of schools as we know them and that teaching will be done at home on the computer. The teachers did not feel that this would happen in the South African context. In their opinion there were more pressing issues than computers that would tap the finances in education.

3.2 WHY IN-SERVICE TRAINING WAS NECESSARY?

I needed to consider what constituted successful in-service activity. On the whole, teachers took part in in-service activities because they identified a particular need in a school or classroom. At our school the need identified was that the school possessed computers but did not have a specific computer policy. (See chapter 5.) The computers had been at the school for a considerable time and were not being used effectively because the teachers did not know how to use them. They therefore needed to be trained how to use the computer in the classroom.

Furthermore, I as the initiator needed to gather information to substantiate the view that teachers needed to receive in-service training in the use of the computer in the classroom. This would hopefully encourage and motivate the teachers whom I would be selecting to participate in my in-service course.

Many children in our school were used to having computers in their homes. The situation could very well arise that what we taught at school might become boring because what the child learnt out of school could have been so much more stimulating and exciting. They had access to television programs and computer programs and so teachers needed to be able to provide the same kind of excitement and stimulation at school. The television set at our school was being used effectively and I believed that it was important that we also used the computers effectively. In my opinion, to remain relevant, the school needed to keep abreast with what was happening in the outside world otherwise the children might lose interest in the innovation. Just by looking around us we become aware that computers have become a part of life in many fields of society: banks, supermarket tills, computer games and computerised booking for recreation and entertainment. A pupil moving out of school into society would need to have some knowledge of computers and how they operate. In my view it was becoming more and more evident that schools would have to move

with the times and include computers in their educational systems. The teachers expressed their concern that a standard two pupil leaving the school in eight year's time would have less problems in his job situation if the school provided him with some computer experience.

I agree with Moore & Thomas (1980:i) who maintained that computer experts and naive users alike were aware that the lives of everyone of us would be affected to an unknown extent by the introduction of microcomputers into our jobs, our homes and our leisure activities. Schools would not escape these changes. It followed that teachers needed to be equipped to cope with the situation so that they were in a position to assist their pupils to become familiar with computers.

The teachers agreed with Bliss, Chandra & Cox (1986:49) and Levin (1981:102) who stated that the main factor inhibiting the use of microcomputers was the lack of teacher training. They went further and said that it was one thing to put microcomputers into schools but quite another to incorporate them properly into the curriculum. Milner (1981:108) said that some educators did not seem to realise the relevance of computing in the curriculum and therefore gave it a low priority. The position at our school was that the teachers realized the relevance of computing in the

curriculum but that it had received a low priority because they had not received the necessary training to implement the computer in the classroom.

I agree with Joiner, Miller & Silverstein (1981:15) who stated that some teachers were reluctant to accept computers, to experiment and explore the potential of computers as an aid to their teaching. They were of the opinion that it meant changing all the methods they had developed over the years. In-service training was therefore necessary to attempt to change the views of these teachers and my approach towards this was one of teamwork and co-operation within the whole school. The teachers were to see themselves as being a part of the solution and not merely someone who had to carry out someone else's policy.

There was talk in our school of changes coming and the teachers needed to be prepared for them. Parents and pupils had been enquiring as to why the computers were not being used in the school. In discussions with parents, I realised that they were aware of how important technology was and that they would like their children to be introduced to computers as early as possible.

It became evident to me that the microcomputer raised complex issues for our school. There were feelings amongst teachers that

something of consequence, possibly of fundamental importance, was happening that had implications for them and their pupils, yet it was difficult to define the problem or indeed simply know how to start. The teachers feared that they would be required to use the computer in the classroom without having received proper training. They would need assistance and guidance so that when the computers were put in their classrooms, they would be able to use them with confidence.

The survey showed that the teachers in our school were aware that they would have to face the challenge of how to deal with the computer in the classroom. The school's objective was to provide each class with its own computer or alternatively to introduce a system of sharing. Billings (1981:88) said that to use computers successfully, teachers needed to know what they wanted the machine to do and what the machine was capable of doing in their classrooms.

A further issue raised by the teachers was the need for information on available educational software and to be in the position to make their own decisions about selecting software.

Miller (1981:93) supports the need for in-service training when he says the following:

There was an opportunity for teachers to direct, control and decide what computers could do for the curriculum and the classroom. It was a time to learn, to move with careful consideration and to be an active participant in the development and analysis of materials. It was not time for hesitancy, inaction or delay.

The teachers agreed with this view and they felt that the computer's potential for opening teaching and learning opportunities lay within their grasp.

Wayth (1983:6) stated that CAL had the potential to cater for differences in the ability of children. In my view the programs which I wanted to use with the teachers could assist the less able child by providing practice at some relatively simple skill that needed to be acquired. The computer would go on encouraging and repeating until the child achieved his goal. The programs were also sufficiently flexible for providing a challenge to the brighter children.

The computer could also be seen as an assistant to the teacher in that it could take some of the work load from the teacher when it offered classwork that was currently being attempted in the class. The program running on the computer would provide the children with additional practice either in the same way as the class was being taught, or by offering the same material but with a different form of presentation. Wayth (1983:23) says that it was

of no value to run a program in a class dealing with the geometry of triangles when on that day the topic in mathematics was percentages. Properly harnessed the computer would emphasise, reinforce and test the work in progress. Furthermore, if the program coincided with the subject matter being taught at a specific moment, the computer would not be seen by the pupils as some extra entity but rather as an integral part of their learning environment.

I agree with Moursund (1981:116) who felt that progress in solving the teacher education problem has been very slow. Computer assisted learning and computer literacy does not form a compulsory part of teacher training. I am aware that colleges of education and universities in South Africa are now including a computer course for their teacher education candidates. This has recently started and when this is coupled with the magnitude of the in-service teacher-training problem, I appreciate why the progress of computers in education has been slow. Encouraging is the fact that the Cape Education Department has stated that subject to the availability of funds, a project will be phased in over ten years making computers available for instruction and learning in all schools under its control. (DEC NEWS 1990:1) It has become obvious that schools themselves would have to do something about the situation.

According to Self (1985:169) the majority of teachers had deep doubts about the role of computers in education, but there was some reluctance to voice these doubts. This was partly because they feared that their doubts were without foundation but were a result of their own ignorance of computer technology. The survey showed that if teachers in the school received in-service training and used the computers in the classroom, they would be in a better position to make evaluative comments.

I agree with Wayth (1983:13) who said that through using the computers, children (and teachers) would come to understand them and through understanding them, would come to use them more effectively.

3.3 IN-SERVICE TRAINING PROGRAM : SUGGESTIONS

Once the school had established why it wanted to do in-service work, it needed to work out what kind of activities would help it to make the improvements it was looking for. The first step which we planned to take would be the initial in-service training course discussed in chapter 5.

Future plans which I had in mind included the following:

- trying out classroom activities and comparing notes;
- inviting speakers or consultants;

- having a series of discussions;
- conducting practical workshop activities;
- going on visits to other educational institutions where computers were being used for CAL purposes;

It was important that we knew exactly why we were intending to start on some in-service work and what we wanted to achieve because these were necessary starting points for the skilful planning of the activities likely to be most useful.

I did not feel that it was necessary for the class teacher to know how the machine dealt with the information. Of more importance was that the teacher needed to know:

- of what use it would be in the classroom;
- whether it would improve the performance of the children;
- how would it benefit the children;
- how they could best use a computer?

Teachers would need to discuss how to use the available computer/s in the most effective manner.

My intention was to present a course in CAL which Jones (1980) described as follows:

CAL is a learner-oriented application of the

computer. It involved the use, and potential use, of computers with individuals and small groups where the emphasis is on the learner. That the learner is actively involved in the whole process is important, he is not a passive receptacle to be filled with knowledge.

Supporting this viewpoint, I felt that this was the area in which the children and teachers in the school could benefit the most.

I agreed with Wayth (1983:23) who said that the computer was a versatile tool and should be used as such. In our mixed ability classes it would be of no use to use the same program for the weaker child and for the brighter child. The skill of the teacher would need to be developed to know which program to use for which child. The teacher should be well acquainted with both the class and the scope of the programs available. One of the aims of the course would therefore be to assist teachers to analyse educational situations in order to find out which of the available CAL programs could be used to improve the learning process. The teachers would be guided to plan, implement and test educational packages.

Experience has taught me that the lack of knowledge on educational software and its applications sometimes misleads a teacher. On the one hand, the computer was employed when, from an educational point of view, better results could be achieved by avoiding its

use. On the other hand, it was not used when it could efficiently have contributed to simplify the introduction of new topics or reinforced knowledge of topics already covered. It was considered essential that teachers be taught to know when and when not to use the computer. Teachers would be given the opportunity to examine examples of software that illustrated a range of uses across the width of the curriculum so that they were in the position to make appropriate decisions. They would need time to experiment with the machines at a personal level. It would be unnecessary to expect every teacher in the school to become an expert in a technology that has only hinted at its potential and not yet established its usefulness. A possible solution was to have one person on the staff who had expertise and who could act as an adviser and consultant to colleagues.

I agree with Forcheri & Molfino (1986:138) who stated that it was necessary to train teachers in CAL to:

- overcome any possible fear of modern technology;
- understand what a computer could do that a well-trained and experienced teacher could not do;
- explore standard educational situations to decide if and which type of software could increase the quality of teaching and learning;
- critically analyse software to define how useful it could be in

- a specific educational situation;
- be in the position to assist a programmer in the designing of software when its use could increase the quality of teaching and understanding;
- effectively implement suitable software.

This I believed would be possible with a sympathetic and thoughtful approach. Before the course was presented, it was important to inform the teachers as to what the intention of the course was and what would be expected of them.

It was also necessary for teachers to know:

- how to introduce the children to a computer;
- how to teach children to operate the machine;
- what the basic maintenance of the computer and the software was;
- the mechanics of using a computer, including how to turn it on, load and run a software program;
- enough about the computer to view it as an aid to their teaching and not be afraid of it;
- how to use the computer to do the things they wanted it to do;
- how to initialize disks.

These skills would enable the teachers to be more comfortable with

the computer and begin to dispel fears and misunderstandings.

I was of the opinion that teachers did not need to become computer programmers, but that the trainer should at some stage discuss programming with them so that they were aware of what it entailed. To develop a computer program that was a significant addition to the present libraries of CAL software required a major time commitment by a committed individual. I agree with Hofmeister (1984:10-4) who felt that it was unreasonable to expect teachers to write their own CAL programs as a part of their normal duties. The teacher's time would be much better spent intelligently applying the quality software that already existed. I felt that it would be sufficient if a teacher was an informed user. This would enable the teacher to write small programs that would help in the operation and maintenance of computer systems by doing such tasks as transferring files, making back-up copies, and bringing peripherals on line. By being able to do this would firstly take some pressure off the shoulders of the trainer and secondly could eliminate some frustration on the part of the teacher.

According to Bliss, Chandra & Cox (1986) teachers should be led to see the computer as a means of motivating pupils. They in turn should be able to lead the pupil to experience the computer as an aid to learning that they could control.

3.4 WHEN COULD IN-SERVICE TRAINING TAKE PLACE?

The most vexed problem facing me was that of when the in-service training programme could take place. There was the straightforward but vital consideration of choosing convenient times and lengths of times which would be adequate but not an impossible burden. I realized that skills not only of organizational but of diplomacy were needed here! An over-ambitious program could lead to skimped preparation of ideas or inadequate trying out and this could be simply counter-productive. A too leisurely program could lose its momentum and not be given the importance it warranted. Perhaps the organizing skill that was needed could only be developed with experience of how long things took and the kind of time required by different tasks. The teachers agreed that they would find it very difficult to make time when there were so many other priorities. Although this was true, they were nevertheless willing to try to organize themselves so that they could fit into a time-schedule which I drew up.

The only time available for training was after normal school hours. We would have one hour of formal training per week. The time in-between would be used to become fully acquainted with the programs and also to use them in the classroom. This would take much of the teacher's time for which very little credit would be given. Here I am referring to relieving those who were involved

in the course from some of their other responsibilities. The teachers carried a heavy workload and the fact that they were willing to accept an additional one was an indication of their enthusiasm. It would make matters easier if the training could take place during school hours, an issue which was also raised by Wayth (1983).

I was aware that to achieve success with in-service training would need careful planning. I was of the opinion that a training course of only a few weeks would not be sufficient to attain the necessary abilities and I believed that in-service training should be a continuous process over a period of time.

3.5 WHO, IN THE SCHOOL, SHOULD BE INVOLVED WITH THE COMPUTERS?

Engaging people's interest and encouraging them to play a reliable part in what was extra work needed skilful handling.

In my opinion there were two possible approaches that could be followed:

Firstly, if we were able to achieve our objective of having a computer in every classroom then it would become compulsory for all teachers to become involved. This approach would possibly mean that it would be preferable that everything that involved computers should be done during the normal school hours so that no

staff member would be in the position to refuse. This approach would require a lot of understanding and patience on the part of the headmaster and the trainer. To force somebody to do something which did not form part of departmental policy may in some cases be asking too much, but I believed that if the approach was correct then success would be achieved.

Secondly, if a school did not have the means to have a computer in every classroom then there were two possibilities. Either all the teachers could be trained, or only those who were interested could form an initial computer group. The approach taken will be discussed in detail in chapter 5.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.1 ACTION RESEARCH

I have selected action research as my approach. Cohen & Manion (1980:174) describe it as follows:

Action research is a small-scale intervention in the functioning of the real world and a close examination of the effects of such intervention.

This suited me as I was doing a case study of one particular primary school. It placed its emphasis on a problem, here and now, in a local setting, in this case, teachers who were unable to use a computer for the purposes of CAL and who needed to be trained to do so.

Action research is a suitable method when it concerns innovation and change, aspects which were both very much a part of this study.

Two of the purposes of this method of research as mentioned by Cohen & Manion (1980:176) were that it was a means of in-service training and a means of injecting additional or innovatory approaches to teaching and learning into an

ongoing system.

It was a method which could incorporate the ideas and expectations of the people involved.

Characteristics of this method which suited my study were that it aimed at improving practice, it was flexible and adaptable and that it relied chiefly on observation and behavioural data. Over the period of the study, information would be collected, shared, discussed, recorded, evaluated and acted upon.

Although, according to Best (1981:22), action research has been deprecated by many observers as being nothing more than the application of common sense or good judgement, it did apply scientific thinking and methods to real life problems.

It is important to realize that research may be carried on at various levels of complexity. My field of research has not been of such a nature that a more sophisticated experimental method with more precise analysis needed to be followed.

Further points of criticism was that action research was situational and specific; its sample was restricted and unrepresentative and its findings were not able to be generalised but fairly restricted to the environment in which the research was carried out. While these criticisms hold in most instances, in my case they were unfounded as I believe that my study could be used as a basis to work from in any school which possessed computers.

4.2 RESEARCH TOOLS

Here, I am referring to the instruments used for collecting data from human subjects.

4.2.1 QUESTIONNAIRES

I provided each participant with a questionnaire (Appendix A) at the beginning in order to indicate how the selected teachers felt about computers and it also gave me some indication of the diversity of the group. A second questionnaire (Appendix C) was provided towards the end of the in-service training course. My reasons for using questionnaires were: Firstly, time was a major factor. I needed the data as soon as possible and a questionnaire would fulfil this need more quickly than individual interviews. Secondly, the teachers themselves, especially

regarding the second questionnaire, wanted time to think about each question. Thirdly, I was in the position to explain the meaning of items that may not be clear. Fourthly, I could be certain of one hundred percent returns. Fifthly, the teachers were able to complete the questionnaire while participating in the course. When they felt that they were able to provide a response to a question, they could do so.

The fact that the second questionnaire was such a lengthy one was not a problem because the teachers were not strangers and they had a genuine interest in what was being investigated.

The questionnaires contained both open-ended and forced-choice questions. The forced-choice questions were suitable especially in the first questionnaire but the second questionnaire called for more open-ended questions where a greater depth of response was needed. It was important that the respondents revealed their personal reasons for their responses.

I constructed the second questionnaire as the course progressed and therefore the questions which were included

were all relevant and to the point.

4.2.2 INTERVIEWS

I have stated that the time factor was the main reason why I used the questionnaire rather than the interview. However, interviews were arranged with those teachers who needed to provide more clarity regarding their responses to certain questions on the questionnaire to ensure that my interpretation of their answers and their interpretation of the questions were correct. This eliminated one of the disadvantages which a questionnaire may have, namely interpretation. These interviews were of the less formal type as, according to Cohen & Manion (1980:241), the interviewer was free to modify the sequence of questions, change the wording, explain them or add to them. These interviews were very valuable as I was able to clarify any question, stimulate greater insight and thereby penetrate to beneath the surface of some reactions.

Because of the very close working relationship which developed during the course, a feeling of mutual trust developed between myself and the teachers and they were therefore willing to respond honestly and openly to the questions put to them.

Throughout the course the informal interview was used with the teachers as well as the pupils. This was in the form of discussing key issues in a conversational style. This provided very valuable data.

The interview was particularly appropriate to obtain data from the children as a questionnaire was unsuitable to use with the children in those age groups.

4.3 PARTICIPANT OBSERVER

I took this approach because I wanted the teachers to feel that we were all in this together because it was in the interest of our school to reach the stage where all the teachers could use the computer in the classroom. We were a team working towards a goal and I was just as much a part of the team as any one of them. We would all be observing, discussing, suggesting and evaluating. They were not to see me as being someone sitting on the outside looking in.

Being a participant observer I was able to discern ongoing behaviour as it occurred and also to make appropriate notes. I was able to develop a more intimate and informal relationship with these teachers.

I am convinced that the approach taken by the selected teachers helped to reduce the criticism of subjectivity and bias.

CHAPTER FIVE

THE IN-SERVICE TRAINING COURSE

Experience has taught that to launch into in-service work without a clear idea of what the school wanted could result in a great deal of wasted time. The clearer the school could specify what it wanted, the more useful the in-service activity was likely to be.

Since a teacher has little time at his disposal, it was necessary to identify closely the problems relating to the computer in the school. In my opinion everyone involved had to assist in identifying exactly what those problems were and to plan and organise activities which would be effective in addressing them.

Since it has been my experience that many teachers who attend 'crash' courses generally get lost along the way, I felt it necessary to choose a specific approach to the in-service training course, namely, one which included follow-up, encouragement, motivation and support. The teachers should under no circumstances feel that they are on their own. This I felt to be especially true when one was working with teachers who had had little or no experience.

5.1 SELECTION OF TEACHERS

At the beginning of the academic year I requested the headmaster to furnish me with the names of the teachers who were involved in computers at the school so that I could remove them from the list from which I was going to make my selection. I was quite surprized to find that out of a school of thirty staff members, only a few had had experience of computer literacy courses with children. I then selected randomly from the list without having any prior information about any of the teachers. What suited me very favourably was that I had just started teaching at this school and therefore did not know the teachers. I made my selection within the first two weeks of the school year. I wanted to select the teachers before being influenced by extraneous factors since I needed to determine whether any teacher could benefit from my approach towards in-service training.

I would have liked to have included all the teachers in my in-service program, but the lack of facilities did not allow for this. There were twenty-one classes and eight computers in the school. I therefore had to look at what I thought would be the best way to use the available facilities. I decided on the following:

3 teachers in standard 2	2 computers
2 teachers in standard 3	1 computer
2 teachers in standard 4	1 computer

2 teachers in standard 5 2 computers

1 teacher in the special class 1 computer

One computer was to be kept for any teacher who needed it for administrative purposes.

I included three teachers in the standard two section because they had five class groups whereas the others had four. Two computers would be available for the standard five group because I wanted the standard five pupils to have as much hands-on experience as possible before going to the secondary school.

Having selected the teachers on paper it did not follow that all would be willing to participate. Past experience had shown that better results were achieved if teachers were encouraged and motivated to use the computer and not forced to do so.

I approached each of the teachers individually and they were all keen to learn more about the use of the computer in the classroom.

To give me some indication of the diversity of the group, I gave each teacher a short questionnaire to complete (Appendix A). The responses to the questions were as follows:

(TEACHERS IN BRACKETS)

Question 1: 2 none (G, J)

7 very little (A, C, D, E, F, H, I)

1 extensive (B)

On further questioning I discovered that the seven who had responded with "very little" had attended a compulsory computer literacy course. The teacher who responded with "extensive" often used the computer as a tool but had never used it for the purposes of CAL.

Question 2: 4 excited (B, C, G, H)

4 unsure (D, E, F, I)

2 excited and unsure (A, J)

Question 3: 7 Use it for teaching in the classroom (A, C, E, F, G, H, I)

2 Own use for schoolwork (D, J)

1 To teach pupils computer literacy (B)

It was encouraging to see that most of the teachers wanted to use the computer to assist them in their teaching.

Question 4: 6 Use a wordprocessor (A, C, D, G, I, J)

6 Use a spreadsheet for marks (A, C, F, G, I, J)

5 To teach pupils computer literacy (A, B, C, E, G)

9 To use the computer in the classroom as a teaching aid (A, B, C, D, E, F, G, H, I)

The fact that the majority of responses were to use the computer in the classroom as a teaching aid suited me. It was interesting to note that computer literacy received the least interest.

Question 5: 5 All the courses at the same time (B, C, E, F, J)
5 One course at a time (A, D, G, H, I)

The fact that half of the teachers opted for one course at a time influenced my decision to continue the planned approach of using CAL only.

Question 6: 2 Yes (B, F)
8 No (A, C, D, E, G, H, I, J)

I needed to know this because I felt that it was important that the teachers knew DOS commands such as format, diskcopy, calling up a directory and delete.

5.2 APPROACH TAKEN AND MATTERS WHICH NEEDED TO BE ADDRESSED:

5.2.1 SCHOOL ORGANIZATION

When I arrived at the school, the eight IBM-compatible computers were in a computer room and a teacher was taking eight pupils at a time for courses in computer literacy. This meant that the same pupil would return to the computer room once every five weeks - in my view a most unsatisfactory situation.

Prior to my arrival at the school a considerable amount of money and effort on the part of the staff had been put into the preparation of the computer room. For me to have removed the computers and place them in the classrooms would have been unreasonable and would have met with resistance. The teacher responsible for the running of computers at the school was on study leave which made matters more complicated because I did not want to interfere with what he was already doing. I therefore approached the headmaster and explained to him what I planned to do with the computers in the school. It was decided that I ought to discuss the matter with the responsible teacher, and a meeting was arranged. It was agreed that I should have three months, starting February, to implement a revised computer policy.

5.2.2 PARENTS

The next step was to inform the parents of what I intended doing as they had provided the funds to purchase the computers. At the time they had been told that the computers would be used expressly for computer literacy. I addressed the parents and put my case to them. It is important to bear in mind that only ten classes out of a total of twenty-one would be able to participate in the research and this could have led to unease amongst the parents. Surprisingly, no parent raised this complaint, but some of the parents felt that the computers should rather be used for computer

literacy courses. My answer to these parents was that our long-term objective was to have a computer in every classroom for the purposes of CAL as well as a computer room for computer literacy. I did, however, stress the point that my research would be concentrating on in-service training and was not intended to be a comparative study between CAL and computer literacy. The parents were prepared to leave the decision of what to do with the computers in our hands. I assured the parents that I would keep them informed of the progress made.

5.2.3 GROUPINGS

My original intention was to train all the selected teachers at the same time. This would have placed less demand on my time but it would have diminished the amount of individual attention, which I felt to be important. Another problem was to find a suitable time slot. This was difficult because of the teachers' individual programmes, and I needed to revise the original plan.

It became apparent that an alternative approach was necessary. I decided to divide the teachers into their respective class groups. The two largest groups, namely the standard two group and the standard three group which included the teacher in the special class, would each have three teachers. The other two groups would each have two teachers.

5.2.4 PROGRAMME

A discussion of the revised approach follows.

I drew up the following programme:

Std 2	Monday	18:00 - 19:00
Std 3/Spec	Tuesday	18:00 - 19:00
Std 4	Wednesday	18:00 - 19:00
Std 5	Thursday	18:00 - 19:00

The first lesson included the following:

1. Introduction to the course. It was essential that the teachers knew what would be expected of them and why. I told them that I was by no means an expert in the field of computers in education, but that I felt convinced that they had a role to play and therefore all teachers should be in the position to use them in the classroom. This is where I had identified a problem; teachers were not being trained to use them for the purposes of computer assisted learning. My research would therefore involve the designing of a suggested method of in-service training which could be in the school. I told them that we would be looking at three CAL packages. We would evaluate the packages, use them in the classroom and it would be expected of them to provide feedback.

The school is a bilingual one and therefore I had to select software which was available in both languages. This would make matters easier but it did limit my choice.

2. We practised the following DOS commands because they were needed for the first software package - Format, diskcopy, calling up a directory and delete. My own experience has indicated that it is necessary to do the DOS commands, only when needed.

Each teacher had a computer to work on. It was necessary to go slowly and to allow for enough time to practise. The teachers requested that I write down everything step by step so that they knew exactly what to do. It is important to remember that the majority of teachers had never used a computer before. After a number of repetitions, we went on to the next step.

3. We loaded the first program. This was a spelling program. When I explained the program to the teachers, they were very excited about it because they were all concerned about the spelling abilities of the pupils. We loaded the program and I told the teachers to continue on their own by referring to the documentation. The teachers had problems with this so I led

them through the program step by step. They were impressed with what the program could do. The spelling words could be presented in four different ways:

- flash - the word would flash once on the screen and the pupil would be expected to write it;
- shuffle - the word appeared on the screen in a jumbled form;
- flash and shuffle - a combination of the above-mentioned two;
- the word did not appear at all.

Whether spelling should be learnt in or out of context is often a debatable point. This program enabled the learner to use either method, or a combination of both, depending on the application, preferences and style of the teacher. If in context, the sentence remained on the screen with the spelling word left out. The pupil typed the word and on pressing ENTER the next sentence appeared. If the word was spelt incorrectly, it would be repeated again at a later stage. This continued until all the words had been spelt correctly and then a score would be given. Each time the program was rebooted, the words were presented in a different order.

Although it was aimed at testing and improving spelling

skills, the program could also be used for other grammar-related applications.

4. Together they then had to evaluate the program according to the questionnaire (Appendix B) which I had provided. This evaluation was to be completed by the next session as the one hour was soon over.

5. The teachers had to type in the words of their choice and then use the program in the classroom. My suggestion was that they continued to do the spelling in the normal way. After they had tested their pupils, they would then take those pupils who had not achieved a certain percentage and would allow them to practice those words on the computer and then test them again. In this way they would be able to determine whether the program was of any value and whether the computer could be used effectively for the purpose of teaching spelling.

From the start I realised that some of the teachers would need a lot of assistance. The teachers who had had more computer experience greatly assisted me by helping their colleagues.

The second lesson included the following:

1. Discussed problems which had arisen. The spelling program

needed data to be fed in by the teachers. This resulted in a number of problems. The major reason for this was that teachers found it difficult to find the time to feed in the necessary data. The teachers who had little computer experience found it to be even more frustrating because they were not finding the time to understand the program fully, not to mention the feeding in of the data. Teacher A said that she had sat for about two hours keying in her information and when she wanted to save it, she was unable to do so. This of course was frustrating but, on the other hand, something which many computer users have experienced. Teacher B who was also experiencing a time management problem changed to a different CAL package and began using this very effectively in the classroom. She had evaluated it according to the evaluation form and had found it to be appropriate. She shared with us how she had arranged her class in groups and that the aspects relating to groupwork were being effectively fulfilled. I was greatly encouraged by the fact that a teacher had at this early stage of the training gone ahead and experimented and was willing to share her experiences with the other teachers, because this was what I was hoping would happen. The other teachers were now hearing and seeing what could be done. One of the main objectives of this initial course was that the teachers would be in a position to continue on their

own and that they did not have to rely on me to lead them step-by-step. They were also listening to a teacher who was very much in the same position as what they were in and this appeared to be more motivating than my telling them what could be done. The other teachers were now enthusiastic about using this specific program in their classrooms and this teacher was willing to help them to get their classes going. I limited this program to this specific group as it was suitable for their age level.

2. Discussed the evaluation of the first software package. Teachers D, E, G and H who were using the program in their classrooms evaluated the program very favourably. The teachers who were having difficulties with the program went to the other teachers to evaluate the program. They were also impressed with what the program could do and were keen to reach the stage when they too could use the program in their classrooms.

I realised that I had started with the wrong program in the sense that it demanded too much time and computer experience from teachers who lacked confidence. I decided that I would proceed according to my original plan and that the teachers could continue with the first program in their own time. I would be available to

assist anyone who needed assistance.

3. Explanation of the next software package. This was a mathematics program which catered for all age levels in the primary school. The program required the learner to solve equations (number sentences) in order to overcome an enemy. The game promoted the development of computational and algebraic skills, as well as the understanding of variables, equations, algebraic expressions and functions.

The invaders, in the form of algebraic expressions, appeared at the top of the display screen and moved gradually downwards. The defender, also an algebraic expression, appeared at the bottom lefthand corner of the screen. The pupil had to type in the number that would make the value of the algebraic expression of the defender equal to the value of the invader above it. The calculated value of the defender moved up to destroy the invader. The defender then had to be moved to destroy the next invader. If the invader reached the bottom of the screen without being destroyed by the defender, the pupil lost the game.

Scoring was based on the number of invaders and how many the pupil shot down in the time given. At the end of the game,

the screen displayed the points. The pupil could now choose to repeat the game at a lower, higher or similar level, or quit the program.

4. We worked through the program together so that the teachers would have the necessary confidence to use it in the classroom.
5. Discussed a means of evaluating whether learning was taking place. I suggested that a class list be put up on the notice board next to the computer. On it, each pupil would write his/her scores and only when a certain level was reached, was the pupil allowed to proceed to the next level.
6. The teachers were given an evaluation form to evaluate the program by the next lesson.
7. I informed the teachers of the questionnaire I would be giving to them. (Appendix C) This is discussed in Chapter 6.
8. I informed them that I would be coming to the classrooms merely to observe what the pupils were doing and to assist the teachers if they needed help. Unfortunately my time was limited and I was unable to spend as much time in the

classrooms as I would have liked. The time that I did spend in the classroom was very encouraging in the sense that the pupils were using the programs and they appeared to be very excited about it. I relied very heavily on the teachers for feedback relating to the effectiveness of the program.

9. I asked the teachers to make notes of anything which they felt to be important.

At this point some of the teachers requested that we should have the classes in the afternoon as this would result in them not having to return to school as they were on the premises. This appeared to be what the majority of the teachers wanted. This led to a further revised program. (Appendix D) This was by no means the final program as it had to be adapted and modified as progress was made. It was important to accommodate the needs and wishes of the teachers because fall out would have reduced the effectiveness of the research. I, as the trainer, needed to be flexible in my approach. As mentioned earlier, I was given three months to complete my fieldwork but in the end I needed six months to complete what I had set out to do.

The third lesson:

1. We discussed problems and exchanged ideas. Teacher C, F, G and H expressed their concern about how to accommodate each

pupil. I told them that it was not important that each pupil had exactly the same amount of computer time. Teacher C said that this was how she felt but that she was not sure whether this was the correct approach. The other teachers expressed their agreement and said that each teacher would have to use his or her own discretion. Teacher B said that these types of problems were to be expected and that by working in groups it was possible to discuss them and work out strategies together to overcome them. I explained to the teachers that we were in what one could refer to as an abnormal situation in the sense that this was a novelty to the teacher as well as the pupil. Every pupil wanted to have a turn at the computer irrespective of whether they were gaining anything from the content or not. They agreed that this situation should change when the pupils were more accustomed to having the computer in the classroom. The computer would then become a part of their everyday learning environment and individual pupils would use it for their specific needs only.

Teacher C also raised the question of the slow pupil who was actually the one who needed more drill and practice, but who was so slow that if he spent time at the computer, he would not finish his normal schoolwork. I then emphasised the fact that very thorough planning was needed on the part of the

teacher and that it may even be necessary for the pupil to work at the computer during the afternoons. A few days later teacher E informed me that she had pupils coming back in the afternoons and that this was proving to be successful. No pupil was being forced to come. Only time will tell whether this arrangement could be sustained.

2. We discussed the evaluation of the second software package. All the teachers had used the program in the classroom and were convinced that learning had taken place. They did agree that the program was not suitable for all the pupils and this assisted them in understanding the role of CAL. The teachers felt that one could not evaluate a program thoroughly without first having used it in the classroom. They felt that it was necessary to evaluate the program before using it in the classroom but that there was more value in completing the evaluation questionnaire after having used the program in the classroom.
3. Explanation of the next software package. This was a remedial Afrikaans reading program. It was written to encourage the weaker reader to expand his field of reading. The program used techniques which assisted to solve reading problems. It was especially of value to the pupil who had problems with the

movement of the eyes. The pupil was encouraged to read faster and with comprehension. Scores, in the form of graphs, were kept which indicated the progress made. The reading exercises had different levels of difficulty.

The reading was presented in different formats, namely:

- Erased from left to right
- Moving window
- Moving point
- Flashing line

After having loaded the story, the pupil could ask to see the difficult words. These were presented in isolation and in context. The pupil then started the story. The speed could be adjusted at any time. After having read the story, the pupil was presented with a comprehension consisting of five multiple-type questions. After having answered the questions, the pupil was presented with his score.

4. I told the teachers to use the program with their weaker readers. To satisfy all the pupils and to disguise the weaker reader, they were to let all the pupils run through the first story and then they were to concentrate on the weaker reader.

The fourth lesson:

1. We discussed problems and exchanged ideas. The teachers all experienced the problem of the pupils all wanting a turn. They went ahead and let everyone work through the first story. The teachers who had quite a few weak readers, especially second language pupils, said that they would need a lot more time for this program because there were different levels and the pupils were weak and therefore the whole process was much slower.

2. We discussed the evaluation of the third software package. The teachers liked the program and could at that stage detect some improvement in the reading abilities of some of the pupils. They would however need more time before being able to give a more thorough evaluation. They agreed that it was only suitable for the weaker reader and should not be used for the more advanced pupil.

At this stage the six months given to me was coming to an end and I now had to wrap up my exercise. The teachers were disappointed when I told them that the computers would have to be returned to the computer room. This response was very encouraging because it indicated to me that the teachers would have liked the computers to remain in their classrooms. I assured them that they would be returned to the classrooms at a later date.

5.2.5 SHARING OF THE COMPUTERS

Each class would have a computer every second week for a full week. The teachers felt that this would be the most practical approach. Reasons given were that nobody was under pressure to complete a program by a specific time; the work could continue on a daily basis. Time taken to move the computer from class to class would not be available for 'hands on' experience. Another advantage was that the children would have the time to experiment. Furthermore it would be easier to incorporate the computer into the weekly planning schedule.

5.2.6 PUPIL RESPONSES

During my visits to the classrooms, I was pleased to hear from the pupils that they were enjoying having the computer in the classroom. Some of them did however complain that they as individuals felt that they were not using the computer often enough. I explained to them that they were using the computer more than what they would under normal circumstances - some would be using it more often than others, depending on the available software.

The pupils felt that the computer was a suitable means of conveying information and assisting with learning. However, there were pupils who were looking for more challenging exercises.

I explained to them that this was only the beginning and that in time we would be including different kinds of programs, some of which would be more challenging.

While observing the pupils at work at the computer, I noticed a number of things. What was very encouraging was that they were enjoying themselves while learning. Many of them were not consciously aware that learning was taking place, they were so involved with the activity itself. The fact that the computer made learning more exciting was all the more reason to keep using them in the classrooms and this emphasised my belief that all the teachers should be trained to use them confidently and effectively. The teachers felt that those teachers who were not prepared to use them were being unfair towards the pupils in their classes as these pupils were not being assisted in the learning process in the same way as those pupils who were using them.

The pupils were keen to help one another. This became a problem at times because it sometimes happened that when one pupil was having difficulty, another pupil who had used the program, would shout out the answer. The teachers did comment that the shouting was decreasing as the pupils became more accustomed to having the computer in the classroom.

Some pupils said that what they liked most about the computer was that they were experiencing success and because of this, their self-confidence was increasing.

CHAPTER SIX

EVALUATION AND DISCUSSION

Having participated in the in-service training program, I had discussions with the teachers. Each teacher was given a questionnaire to complete and I formally interviewed four of them. In chapter 4 I explained which teachers would be interviewed. The following points emanated from the questionnaires and interviews: (Note that I only refer to nine teachers because one participant left the school before the course had been completed).

6.1 GENERAL

6.1.1 The teachers felt that the computer could not replace them as teachers. They were unanimous that education was not possible without the teacher, who remained the central figure in education: therefore the computer could merely be used as an aid to the learning process because it had many shortcomings. Human interchange could not be duplicated by computers. The machines had no emotions; they had no capability for intimate interaction which was so crucial to the social and emotional development of children.

6.1.2 Three teachers felt that one computer in the classroom was ineffective. Teacher A still believed that the computers should be in a computer room for computer literacy. She did say however that she had a very full program and that she found it difficult to give serious thought and time to get involved with CAL. She also felt that given time she would still manage to incorporate the computer into her teaching, but not at that stage.

Teacher F had problems accommodating all the pupils in her class. She put this down to the fact that the computer in the classroom was something new and all the pupils wanted a turn. She agreed that once the pupils were accustomed to having the computer in the classroom this should no longer be a problem.

Teacher H felt that the computer could not be used effectively unless all the children had first been shown how to run the programs. He suggested that the pupils should first be taken to the computer room to learn how the programs worked and then they would be in a better position to use the one computer in the classroom. I thought this was a valid suggestion which should be looked at in future.

- 6.1.3 Eight teachers agreed that the ideal situation would be that each classroom has its own computer but that an acceptable alternative was to circulate it on a weekly basis. Teacher A felt that there should be more than one computer in each classroom.
- 6.1.4 The teachers unanimously agreed that CAL was an effective way of learning. The programs must however relate to the curriculum and a variety of programs must be available. This confirmed what Wayth (1983) said. They felt that a significant part of the school budget ought to be set aside for software.
- 6.1.5 Eight of the teachers felt that the computers in the school should be used for CAL as well as computer literacy. As mentioned above, one teacher said that they should only be used for computer literacy. The general feeling was that computers were expensive and therefore maximum use should be made of them.
- 6.1.6 Teacher A was the only teacher who still felt that the computer had a negative affect on class control. This teacher felt that due to her lack of confidence and inexperience, it was difficult to get the computer working

and at the same time controlling her class. She did feel that matters would possibly improve once she could use the computer with confidence. The other teachers were of the opinion that class control had not been adversely affected; some even felt that it had improved because a more thorough planning of time was needed to accommodate the computer.

- 6.1.7 The teachers said that the computer had not affected their teaching methods. Those who had expressed the fear that they would drastically have to change their teaching methods said that their teaching had continued as normal and whenever a pupil had a few minutes to spare, he/she would go and work on the computer.
- 6.1.8 They did feel that initially the computer demanded more of their time, but once the pupils knew how to use the programs and the teachers became more efficient, this was no longer a problem.
- 6.1.9 Teachers A, D and F were still of the opinion that the computer was a cold and impersonal method of teaching. The others did not agree with them.

- 6.1.10 The teachers all agreed that thorough planning, which confirmed what Wayth (1983) said was needed if the computer was to be used effectively in the classroom. They said that teachers should know exactly what software was available so that they could incorporate the programs into their teaching at the appropriate time with the pupil who could benefit from it.
- 6.1.11 All the teachers barring one said that the computer gave them the opportunity to individualise more easily. This would be even more so once there was a greater supply of good software available at the school, software which could cater for the needs of the individual pupil.

6.2 PUPIL INVOLVEMENT

- 6.2.1 The teachers understood that the pupils would not all have the same amount of time on the computer. It would depend on the available programs and the individual needs of the pupils. They felt that it was the responsibility of the teacher to meet the needs of all the pupils. There were pupils who took longer to complete a task and would require more time.

- 6.2.2 The teachers all found the teacher-assistants to be of great value.
- 6.2.3 The teachers were no longer affected by the possibility that a pupil could break the computer. They still felt that if it broke while using it effectively, they had no problem with it.
- 6.2.4 Teachers A, F, G and H were of the opinion that a pupil should have a thorough knowledge of the keyboard if any success was to be achieved with CAL. They felt that a lot of time was wasted especially if the pupil was expected to type in words or phrases. I expected teacher G to say this because he was a strong supporter of computer literacy. Teacher H added that the pupils' keyboarding should improve with time.
- 6.2.5 All the teachers except F still strongly agreed with Bliss, Chandra & Cox (1986) who felt that the computer did motivate a pupil. The fact that they competed against themselves was a strong motivating factor. Teacher G said that the pupils also enjoyed challenging the teacher. Teacher H was pleased to see that pupils who were normally 'lazy' requested to work on the computer during breaks.

This was very encouraging. Teacher F felt that she had not used the computer enough to pass judgement.

- 6.2.6 Teacher A said that the time had been too short to be in the position to give an honest opinion of whether the pupils benefited much from the computer. She felt that if any had benefited, it was those who did not have computers at home. Teacher B, C, F and I felt that repetition of content assisted many pupils. Teacher G raised the point that pupils set themselves goals which they worked towards. Teacher H felt that pupils benefited because it was easier to differentiate. Pupils were receiving more individual attention than before the computer had been introduced.

6.3 IN-SERVICE TRAINING

- 6.3.1 The teachers felt that the software evaluation questionnaire was comprehensive and suitable. Most of them did still not feel confident enough to evaluate software without having the questionnaire with them. They had a fair idea of what to look for and felt that with more practice and experience it would become easier.

- 6.3.2 Teachers A, D, F and I would have preferred us to have spent more time together evaluating the programs. In future I would have to spend more time with these teachers.
- 6.3.3 Teacher A felt that the programs should be evaluated by a specialist in CAL before giving them to the teachers. Teacher B disagreed and said that the individual teacher would have to make the final decision concerning any program and therefore every teacher must be able to evaluate. The teachers agreed that it was important to evaluate a program before using it in the classroom. This would ensure that no time was wasted on programs which were not suitable. It would also assist the teacher to know exactly which child would benefit from a specific program. Teacher I said that this would ensure that he knew exactly how the program worked and what it offered. They did, however, add that a complete evaluation of a program was only possible after it had been used in the classroom for a reasonable period of time.
- 6.3.4 Teachers B, C, D, E, G and I felt that the in-service training course had increased their confidence in using the computer for CAL. All that was still lacking was

experience.

Teacher A, F and H would have liked more guidance on how to teach using the computer. A matter which needed constant attention was the fact that we were limited to the number of programs used. I believe that once we had a greater variety of software and these teachers had gained more confidence, this problem could be resolved.

- 6.3.5 Teachers A, D, E, F, H, I felt that the time had been too short for them to feel confident enough to continue with CAL without further assistance. This emphasised the fact that in-service training should be a continuous process and that the trainer should be available at the school to provide the necessary training, support, motivation and encouragement.
- 6.3.6 Teachers A, D and I would have liked to have spent more time with one program before having to move on to the next one.
- 6.3.7 The teachers generally preferred using a program which did not require the teacher to feed in data. This was too time consuming and as a start was too involved for a

teacher who had had no experience of computers. They recognised the potential of the spelling program, but felt that they would need more time before being able to use it effectively in the classroom.

- 6.3.8 The majority of the teachers were of the opinion that the in-service trainer should be a staff member. The reasons expressed by them was that such a person was close at hand and was in a better position to understand their needs. The teachers felt more at ease because they were working with someone known to them. This eliminated the situation which many of them had experienced; they attended a course and after this they were left to themselves without any follow-up or support which consequently resulted in their not being able to continue as was expected.
- 6.3.9 All the teachers except A and F felt that this approach to in-service training would succeed in getting all the teachers in our school to use the computer effectively for the purposes of CAL.
- 6.3.10 The teachers felt that the idea of working in classgroups was a good one. They were able to share ideas more freely and could together select software which was applicable to

their age-groups.

6.4 DISCUSSION

Arising out of the teachers' comments it was found that if at all possible in-service training time should be catered for in the time-table. This would eliminate the problem of having to find a suitable timeslot somewhere in-between the teachers' extra-mural program and other responsibilities. I believe that if schools are really serious about computers, it would be possible to work out a system so that the time-table could accommodate this. This time could be used to evaluate software, share ideas, read computer journals and discuss problems on a regular basis so that the computer project in the school could be seen by the teachers as a team effort.

We started with evening classes, but at the request of the teachers, we changed to afternoon classes. The evening classes ran more smoothly, but the teachers preferred to have the classes in the afternoon because this saved costs and time and the teachers all had homes to attend to.

Responses from the teachers indicated that the trainer should assist the teacher in the selection and training of a

specific group of pupils (teacher-assistant group) in the class and make them responsible for the loading of programs. This would take a lot of pressure off the teacher and would contribute towards the smooth running of the computer in the classroom. Both teacher and trainer could spend extra time with these pupils in order to help them to understand the programs.

The teachers agreed that they needed to design a system for monitoring how much time each pupil was spending on the computer. It was essential to ensure that all pupils were using the computer even though it was not essential that all pupils must have exactly the same amount of computer time. Some pupils would use a specific program more often than others. It all depended on what the teacher's objective was with the program. It would be pointless for pupils to use a program just for the sake of using it. This of course meant that there should be a sufficient variety of good software so that there was something for everyone.

When given a new program, the teachers felt that they needed time to work through the program thoroughly before an in-depth evaluation of the program could take place. The hour set aside for in-service training was to be used to work

through the program and attempt some form of evaluation and thereafter the teachers would need to complete the evaluation within a specified period of time, say, a week. It was important that the evaluation did take place and was not neglected. To eliminate frustration, it was found that all the teachers needed to have access to a copy of the program and the documentation. If only one copy was available, I suggested that a standard did a group evaluation as the same aims would apply to a large extent. Individual impressions could still apply as each teacher would have his/her own evaluation form. A master copy of each program should be kept in the strongroom.

The teachers said that the trainer should not try to give the impression that he knew a lot and they knew very little. The teachers felt that the trainer should not express any signs of impatience as this could result in their losing confidence in themselves.

The teachers agreed that the in-service program should be flexible so that it could be changed because the pace had to be determined by the individual participants. The teachers who had had some computer experience managed to use a program quite easily while the less experienced teachers

needed much encouragement and sufficient time to become confident with the specific program before moving on to the next program. If the trainer moved too quickly, the teachers became overwhelmed and confused. The more confident teachers were used to assist the other teachers and this seemed to work very well. The computer was used for one week in the more experienced teacher's class. This teacher would then work out a practical method of using the program in the classroom. When the computer went to the less experienced teacher's class for a week, the more experienced teacher assisted his/her colleague.

The teachers felt that the trainer should not be prescriptive about how to use programs. They wanted to be assisted in such a way that they could determine individually when and how they were going to use a specific program. They agreed that they should be able to evaluate the program in the same way as they would evaluate a text book.

From the questionnaires and interviews it became clear that the teachers had some previous knowledge of computer literacy and when they were confronted with CAL, they initially had difficulty distinguishing between the two. Some of them kept wanting to approach CAL in the same way as

computer literacy - a computer room with all the pupils working on the same program. As they became more aware of what CAL was all about, this perception changed.

The teachers who felt confident using the computer in the classroom, also felt that a good approach would be to pass on their knowledge to those who had little. In this way teamwork could be encouraged and the sharing of ideas could prove to be of value.

CHAPTER SEVEN

CONCLUSIONS

The following aspects are the main points which arose from this research, taking into account the limitations of doing small-scale action research. As this was a case study, the results are situational and cannot be generalised, but refer specifically to the group of teachers researched.

7.1 Teachers

As the researcher, I had to rely on the co-operation of the teachers. I tried to place the emphasis on the fact that the training was for their benefit. However, the possibility exists that teachers do not always see it in this light, and sometimes suspect that the researcher is trying to improve his own position.

Questionnaires and interviews placed an extra burden on these teachers. This feedback made the training more onerous than what it would be otherwise. From my research it would seem to be beneficial to education if all teaching could be geared towards research because this feedback that one derives from a research approach to education provides useful evaluation of one's own teaching.

It became evident (as stated in chapter 3) that although teachers could be provided with the hardware, software and training, it would still take time before they all felt confident to use the computer effectively in the classroom.

During the course I realised that what was exciting for one teacher was threatening to another. The trainer needed to be aware of this and plan to work with each teacher on an individual basis. This was all the more reason why the trainer should be a staff member so that he/she would be easily available when needed.

The teachers said that they felt rushed because before they could fully implement one program, they were given another. During the training I did become aware that the less experienced teachers preferred to be confident with one program before moving on to the next one. This should change as they become more confident.

During the in-service course it became clear that the eventual success of the computer in the classroom was going to depend on the individual teacher. No amount of in-service training was going to guarantee the successful and continual use of the computer in the classroom for CAL purposes. Each class teacher's commitment varied in the use of the computer in the classroom.

The computer could be seen as an extension of the teacher. The teachers said that it was able to do tasks which they could not always provide. They were referring to such tasks as immediate feedback, individualization, repetition, motivation and endless patience.

In this study it was found that the computer was able to extend the range of options open to the teacher. The teachers were able to set up situations involving such skills as co-operative discussion (interaction), problem-solving and simulated events. The computer was capable of presenting a number of diverse projects in different ways which assisted the class teachers to get the best out of every child. This was true whether the children were academically gifted or not. The power of the computer was seen to be its versatility.

7.2 The trainer

It was necessary for the trainer to be at the school in the afternoons to provide assistance. Teachers working through programs at the school could experience some difficulty. I felt that they should not go home frustrated and that someone was available who could help them. The teachers confirmed this and some of the teachers became so frustrated at times that they told me that if help had not been available, they would possibly have

given up and disregarded the value of the computer. They just needed that little bit of assistance at that specific moment.

Arising from this research it would appear that the person best suited to head the computer department in a school should be someone who was not only sympathetic towards the introduction of computers and prepared to spend a great deal of time experimenting with the machines, but also someone who was helpful and encouraging towards colleagues.

This case study showed that all the enthusiasm and hard work of the trainer would be for nothing if the support and encouragement of the headmaster was limited.

7.3 Time

In-service training of the kind undertaken in the research placed a great demand on the trainer's time therefore the school should consider this when the yearly planning was done so that time could be made available for the person to carry out the task. The research showed that there should be time for in-service training, the visiting of classrooms and the assisting of teachers.

The computer should be seen as a normal part of everyday life, which it could not be if it was in a room safely out of reach of

the children. There were other more fundamental reasons for this. Time was wasted by children going to the computer-room instead of having it available in the classroom. Whatever the difficulties of portability, the computer should be in the natural environment of the children, namely the classroom. This research has shown that the computers in our school were used more effectively in the classroom than in the computer room.

7.4 Evaluation of software

The case study showed that teachers were not keen to sit down and complete the software evaluation form. They were anxious to get the program running in the classroom and would rather spend that time getting to understand the program. They did agree that a program needed to be evaluated, but in this study time did not allow for this to be done in writing.

7.5 CAL

My role as the trainer included the obtaining of software and introducing the teachers to it. I believed that it was my responsibility to remain abreast with the latest developments in CAL so that I could inform the teachers.

The planning of the use of CAL in the curriculum was restricted by what software was available. If there was no CAL history program,

for example, then the computer could not be used for history. The practice of finding a program and then using it simply because it was the only one available is undesirable. Programs needed to fit the teacher's requirements and should be seen as an extension of his teaching. As this was a small-scale study, little opportunity arose for teachers to evaluate software other than that selected and provided for use in the classroom.

7.6 In-service training

This research has indicated that in-service activity should have two components. Firstly, it should have a classroom element in which teachers experiment with new ideas and become familiar, confident and even critical of the innovation. Without this constant reference to reality, the sharp, practical purpose which is the special virtue of in-service work is lost. Secondly, it should provide adequate time and opportunity for reflection on and discussion of that reality so that the actual program is being developed in a considered and purposeful way in the classroom.

My original time-schedule for in-service work was three months. Initially this appeared to be adequate, but when it came to the practical implications many problems arose. For various reasons the program had to be revised regularly. It was very seldom that I could keep to my schedule for a full week. Types of problems

which arose were:

- other commitments, such as teachers' centre day;
- personal commitments of one or two teachers in the group;
- commitments relating to sport;
- a week in which a specific administrative task had to be completed, which placed a lot of pressure on a teacher's time.

When looking towards the future the school will have to make many decisions about how to use the computers. Factors which need to be taken into account are: the number of classes, the number of computers, the internal organisation of the school, its physical layout and how it should be managed.

Arising out of this case study it would appear that the school should have a computer specialist whose task would be to ensure the smooth running of the computers and the purchase of software in consultation with the teachers.

Following the in-service course, the teachers should now be in a position to make rational decisions about how best to use the computer in the classroom.

RECOMMENDATIONS FOR FURTHER RESEARCH

This study has shown that further research is necessary in the following areas:

1. Determining whether there is a need for a computer specialist in every school which wishes to implement computers for the purposes of CAL.
2. To develop an effective long term computer policy for our school.

I believe that the success of in-service training as undertaken in this case study depended on the commitment of the trainer, a appropriate variety of software, an understanding headmaster and a motivated staff.

Despite the limitations of small-scale research, it would appear from this case study that primary schools elsewhere in South Africa could use this research to guide them initially, in using computers in the classroom.

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SOFTWARE

English Spelling : Nasou

Afrikaanse Spelling : Nasou

Equators : Nasou

Vergelykers : Nasou

Help!-Leesreeks : Nasou

HARDWARE

Eight IBM-compatable machines

APPENDIX A

IN-SERVICE TRAINING QUESTIONNAIRE

TEACHER (eg.A).

Please answer the following questions:

- 1. Experience in the use of the computer **EXTENSIVE/VERY LITTLE/NON**
- 2. What is your present feeling about the use of computers in school
You may mark more than one.

UNSURE AFRAID EXCITED THREATENED WARY

For elaboration:

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- 3. For what purpose would you like to use the computer at present. M
ONE only.

- Own use for schoolwork
- Administration of the school
- Use it for teaching purposes in the classroom
- To teach pupils computer literacy

- 4. I would like to be trained to (you may mark more than one)
 - use a wordprocessor.
 - use a spreadsheet for my marks.
 - to teach pupils computer literacy.
 - to use the computer in the classroom as a teaching aid.

- 5. Answer the following question if you have marked more than one in

question four. Underline your choice.

I would like to do the courses at the same time.

I would like to be totally confident in the one before I move on the next one.

6. Do you have a fair knowledge of MS-DOS? **YES/ NO**

APPENDIX B

SELECTING EDUCATIONAL SOFTWARE FOR CLASSROOM USE (CAL)

1. Name of program being evaluated: _____

2. Evaluator's particulars

Name: _____

School: _____

Years of teaching experience: _____

With which standard/s do you intend using the program? _____

3. DOCUMENTATION

Tick the appropriate block

3.1 Technical

3.1.1 Does the program have any accompanying documentation? YES/NO

3.1.2 Are there any simple loading and running instructions? YES/NO

3.1.3 Does the program require anything other than the most elementary knowledge of the computer to get it up and running? YES/NO

3.1.4 Are the hardware requirements made explicit in the simplest of terms? YES/NO

3.1.5 Are instructions given for making a back-up copy of the disk? If not, do the publishers offer a replacement service for corrupted disks? YES/NO

3.2 Program information

3.2.1 Are the aims and objectives for the program made clear? YES/NO

3.2.2 Does it specify the age and ability range for which it was designed? YES/NO

- 3.2.3 What kind of program is it? TUTORIAL/DRILL AND PRACTICE/SIMULATION/CONTENT-FREE/PROBLEM-SOLVING.
- 3.2.4 Does the program allow for any alterations to be made? YES/NO
If so, are the instructions unambiguous and easy for the non-expert to follow? YES/NO
- 3.2.5 Does the documentation contain instructions for a 'browse mode' or details of a 'sample run'? YES/NO

4. PRESENTATION AND LAYOUT

4.1 Text

- 4.1.1 Are instructions clear and unambiguous? YES/NO
- 4.1.2 Is each frame attractively presented avoiding irrelevant detail? YES/NO
- 4.1.3 Have coloured and double height characters been used to their best advantage? YES/NO

4.2 Graphics

- 4.2.1 Is the use of graphics appropriate to the aims and objectives of the program? YES/NO
- 4.2.2 If pictures and diagrams are included, could they be represented more effectively by some other means? e.g. a map, a photograph. YES/NO

4.3 Sound

- 4.3.1 If sound effects are included, do they constitute an essential and integral part of the program? YES/NO
- 4.3.2 Does the program provide a simple means whereby the volume can be controlled or the sound can be turned off completely? YES/NO

5. FRIENDLINESS AND FLEXIBILITY

- 5.1 Does the program provide helpful messages to correct errors? YES/NO
- 5.2 Is sufficient help provided so that pupils can understand the program without your constant

- intervention? YES/NO
- 5.3 Is the program sufficiently versatile so that the user can control what it does? YES/NO
- 5.4 Is the program sufficiently flexible to be applicable in a variety of teaching/learning situations? YES/NO

6. ACHIEVEMENT OF STATED AIMS

- 6.1 Without actually using the program, and keeping your own pupils in mind, to what extent do you think the program would achieve its/your aims and objectives? LARGE/CERTAIN/
NOT AT ALL

7. ROBUSTNESS

- 7.1 Is it easy for the user to correct typing errors? YES/NO
- 7.2 Are possible errors trapped? When numerical input is required, what happens if you type in a word and vice versa?
- 7.3 When textual input is required, what is the longest sentence you can input? Does the program crash if you enter a longer one? YES/NO
- 7.4 Can you get all the way through the program without entering anything, just pressing the RETURN key each time a word, number or sentence is required? YES/NO
- 7.5 Can the program cope with the input of zero or a negative number? YES/NO
- 7.6 Are the non-essential keys automatically turned off by the program itself? YES/NO

8. SPECIFIC SELECTION CRITERIA

8.1 Tutorial and drill and practice programs

- 8.1.1 Is the content fully described? YES/NO
- 8.1.2 Is the content of the program appropriate to the designer's stated aims and objectives? YES/NO
- 8.1.3 Is the content and presentation appropriate to your class and the use you have in mind? YES/NO

- 8.1.4 Is the micro appropriate for teaching this topic? YES/NO
- 8.1.5 Is the content/information correct? YES/NO
- 8.1.6 Is the content/information accurate enough for the use you have in mind? YES/NO
- 8.1.7 Does the input format suit your purposes? Are there options from which you can choose? YES/NO
- 8.1.8 Does the program provide immediate and appropriate feedback to the user? YES/NO
- 8.1.9 Does the program keep a score or record of the learner's progress? YES/NO
- 8.1.10 Does the program suggest pencil and paper tasks, or other work that might be carried out away from the computer? YES/NO
- 8.2 For tutorial programs in particular
- 8.2.1 Is the content broken down into appropriately small and logical steps? YES/NO
- 8.2.2 Does the program allow the user to revise previous pages or follow remedial loops? YES/NO
- 8.2.3 Will the program take free-format answers in an acceptable number of forms? YES/NO
- 8.3 For drill and practice programs in particular
- 8.3.1 Does the program provide a variety of levels of difficulty? YES/NO
- 8.3.2 Are the examples or exercises randomly generated? YES/NO
- 8.4 Arcade-type games
- 8.4.1 Are the instructions clear and always available? YES/NO
- 8.4.2 Does the program provide a sufficient range of levels of difficulty and speed? YES/NO
- 8.4.3 Is the content of the program available for inspection and/or change? YES/NO

- 8.4.4 Is the content accurate? YES/NO
- 8.4.5 Does the program provide appropriate feedback to the player? YES/NO
- 8.4.6 Does the program keep a score or a record of the player's progress? YES/NO
- 8.4.7 Is the visual display attractive, exciting and absorbing? YES/NO
- 8.5 Simulation games
- 8.5.1 Is it appropriate to use the computer for this topic? YES/NO
- 8.5.2 Is the content of the program appropriate to your aims and to the group you have in mind? YES/NO
- 8.5.3 Are commands and instructions available throughout the program run? YES/NO
- 8.5.4 Does the program or the documentation give sufficient and appropriate clues if the user gets stuck? YES/NO
- 8.5.5 Is there provision to change data if appropriate? YES/NO
- 8.5.6 Can a game be 'saved' and resumed later? YES/NO
- 8.5.7 Does the program give any suggestions as to how it might relate to events in the real world? YES/NO

GENERAL COMMENT

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ASSISTANCE TO THE QUESTIONNAIRE

- 3.1.2 This is important, to save you time, but if there do not appear to be any, you can still get by. Most software publishers adopt a standard procedure for all their programs.
- 3.1.3 It should not be necessary to be a computer expert in order to use it as a teaching and learning resource in the classroom. If you are invited to type in all sorts of strange things before the program will work, it probably means that the program has not been thoroughly planned. A really good program, in this context, is one which will load and run automatically following one simple command, or even better, at the press of a key.
- 3.2.1 It is very important that you should be able to find this out easily before you make any serious attempts to judge the suitability of the program. Unless you know what the designer had in mind for the program, it will be very difficult to assess whether it may or may not fulfil those objectives if used with the class you have in mind. However, sometimes the objectives of a program are deliberately left vague. This is done to enable the user to adapt more readily to the needs of the curriculum. This is perfectly acceptable, provided that it is made clear in the documentation, and you realise that assessing the suitability of the program will take you somewhat longer as you come to consider how you might use it to its best advantage.
- 3.2.2 Sometimes it is quite difficult to decide which age groups would benefit from a program until you have spent some time trying it out. It is a great help if the documentation includes some discussion of this. Some programs have a very specific target age and ability group, these are the ones you must be most careful about. Some tutorial and drill programs may depend very much upon the users having covered certain skills to a certain level. Laboratory simulations generally require the user to have at least grasped the basic principles of the process or experiment before exploring it further. You also need to know something about the difficulty of the concepts involved, something which might appear in the detailed discussion of the program content. However, it is not only content which is important. You need to know whether the style and complexity of the language used on the screen is at a level with which your class will be happy and can cope.

More flexible programs will cater for a wider age and ability range, and you may feel that they are somewhat better value for money, having a wider range of use in the school.

- 3.2.3 This is not always as clear as it might be, and if the author has taken the trouble to discuss the program type in the documentation there is a reasonable chance that some thought has been given to the underlying perspective on learning. Some discussion of the program type may give you valuable clues as to how the author sees the program being used in the classroom, whether it is intended for use with a whole class, a small group or individually. Of course, you will have the final say here in the light of your own experience as a teacher, but if the author has included results of trials carried out in schools, it will give you much more to go on.
- 3.2.4 The best advice for the newcomer is 'if in doubt, then leave well alone'.
- 3.2.5 Very often it is helpful to see what would happen at various points in the program without having to work all the way through it.

You might also expect to find a discussion of any unusual features in the program, things which you might not normally expect.

Most addition programs provide examples of programmers' failure to adapt the computer to the user. When children do addition problems with paper and pencil, the addends are usually one below the other, with the columns in line. The children work the problem from right to left, and mark carrying from one column at the top of the next. Many addition programs present the addends side by side, require the answers to be entered from left to right, and do not provide any way of marking carrying. In using these programs, children often copy the problem, work it on paper, and then enter their answer into the computer. Programs that present problems this way, force the user to adapt to the computer. With more effort on the part of the programmer, the computer could have been adapted to the user.

There are times when pencil and paper tasks are important, and the computer can be used to force children to do them quickly and accurately. This is not unique to computers;

surely teachers do this all the time by organising exercises and activities in such a way as to force their children to look at a problem from a different perspective. Perhaps the best thing to do is to offer teachers the choice, in this instance, of which way the sums are to be presented on the screen. After all, this is an educational decision to be made by the teacher who is going to use the program, a decision to be based upon experience and professional judgement.

4. Here we are particularly interested to see that text, graphics and sound have been used to their best advantage.
 - 4.1.1 Writing instructions which are unambiguous and easy to follow is sometimes more difficult than it sounds. You can never be sure that the reader is going to see the problem from the same angle as you do, or that the style and complexity of language with which you are comfortable will necessarily be understood by others. This is a common problem faced by teachers, and it is always important to ensure that the children can cope with the language, both written and spoken, which they encounter during the course of their studies. This is a particular problem with computer programs because, to avoid constant repetition, instructions may be abbreviated or replaced by a symbol. This is further complicated because it is quite rare to be able to browse through the program or to return briefly to the beginning to have another look at the instructions without having to start all over again. Where instructions do appear on the screen, they should be in a prominent enough place not to be missed, but at the same time they ought not to detract from the activity at hand.

Where instructions are not printed in full, it should be obvious what the child is expected to do. It should be possible to list commands on the screen without disturbing the program run. Where instructions are abbreviated, their full meaning should be obvious, not just to you, but to the children in the ability range that you have in mind. When symbols are used, their meaning should appear all together on one convenient page in the program documentation so that they always mean the same thing, and that they always appear in the same place.
 - 4.1.2 Screen layout is of paramount importance. You should be able to expect that each screen display has been carefully planned to have the maximum effect. This is just as important for the positioning of text as it is for

diagrams and pictures.

- 4.1.3 Very often coloured text can be used to enhance or to accentuate a point, but the careless choice of colours can cause problems. Sometimes this just means that the result is unattractive, the colours clash or tend to merge making it difficult to read the words. More seriously, you should make sure that the choice of colours will not create problems for sufferers from colour blindness.
- 4.2.1 Particularly you will want to consider whether your aims and objectives differ in any way from those stated by the program designer. If they do, it could be that the graphics are too childish or too adult for your group;
- Is the style of graphics suitable for the age and ability group you have in mind?
 - Do the graphics serve to clarify or enhance points being made?
 - If there are no graphics, would the program have been improved by their inclusion?
- 4.2.2 Sometimes, of course, the quality of the graphics is less important than the point being made. However, on other occasions the quality of the picture is all important, and in some cases it might be that the microcomputer is just not up to it. Most maps and some diagrams fall into this category, but, when the object of the program is to exploit the computer's ability to process information rapidly and to represent it as a graph or a bar chart, you have to accept the computer's limitations. Apart from the question of whether the computer itself is up to the job, it is important to remember your objectives and what the program is trying to do. If you think that the program could be enhanced by the inclusion of some pictures, diagrams or worksheets there is no reason why you should not think of the program as a starting point, and put them together in a study pack of your own.
- 4.3.1 Sound effects can be very useful in helping to create realism and atmosphere. Some programs, however, include music or toots and bleeps which are totally outside the user's control, and seem to be there for no apparent reason. What will the effect of sound be on pupils who are busy with other activities?

- 4.3.2 The best programs will provide these options as a matter of course, in fact some will even allow you to make adjustments throughout the program run.
5. 'User friendliness' relates to the ease and convenience with which any program can be used, whatever its purpose. Programs must be 'tailored' in such a way that they suit the needs of the user. In fact the very process of software selection is simply a way of deciding whether a particular program is sufficiently suitable for the needs of the pupils we have in mind. You should always ask yourself whether the program would be easier to use 'if it had a help option available during the run time'.
 - 5.1 Good programs will tell you where you have gone wrong in plain language, and then allow you to have another go without spoiling what you have already achieved.
 - 5.2 One great asset of a computer in the classroom is that it can free the teacher to concentrate on someone else in the knowledge that those using the computer are gainfully occupied. However, if it is constantly necessary to sort out queries because the program is unclear, the object is defeated.
 - 5.3 Some element of choice in terms of pace and level of difficulty is desirable in most programs.
 - 5.4 Programs which offer several levels of difficulty, or a variety of applications to different sets of data or problems can possibly be used on more occasions and by more teachers in the school than those which have more specific and narrow applications.
6. At this stage there is no way of knowing for certain whether the program will ever achieve its stated aims in the classroom because you will not have had a chance to try it. Firstly, you will need to examine the program documentation carefully to ascertain what the author says are the program's aims. You will then need to consider your own aims and objectives, and decide whether these coincide with those of the author. If they do then you need to use your professional judgement, keeping in mind the group of children who will use the program, to decide whether it has a chance of achieving those aims and objectives. You will also need to draw upon your past experience of using computer programs in the classroom, particularly with the group of children in question. If you haven't tried any programs with this group,

or this is your own first time, the decision will be rather more difficult to make. If your own aims and objectives differ from those of the program author, you will need to decide whether you could possibly use it to suit your requirements without too much difficulty.

7. The essence of robustness in any computer program is the degree to which it can cope with three groups of problems;
 - (1) Input errors
 - (2) Unusual or unexpected inputs
 - (3) Accidental use of other keys on the keyboard

What we are looking for in a good program, is the ability to deal with any of these problems without interrupting the smooth running of the program.

- 7.1 A good program will allow you to make changes to the input, through a menu option, or a command, wherever that input could have serious and far reaching effects on the result.
- 7.2 In either case, if the program comes to an abrupt halt, it means that error trapping has not been properly considered by the programmer. Children will be constantly asking for help, and much time could be wasted.
- 7.3 The most characters that most computers will allow in an input is 255, including spaces, after which the program will crash. The program should handle this so that it is impossible to enter too many.
- 7.4 A good program will always contain routines which check inputs to make sure that they are within the expected range or are of the expected kind. If the input does not fit the question, the user should be told why it was unsuitable, and invited to try again.
- 7.5 If the program has to perform some calculations, numbers outside its expected range can cause unusual results or cause the program to crash altogether. Very large or very small numbers can create results which are beyond the scope of the model, division by zero will cause the program to crash unless the input is properly checked by a special routine before any calculations are performed.

- 7.6 While the program is running, the only keys which should have any effect are those essential to the activity. If any other key is pressed by mistake, nothing should happen.
- 8.1.9 This is useful from a diagnostic point of view, although a scoring or points system is probably more useful as a motivating factor. Learners can try to improve their own personal scores, or they can compete against one another. It is useful sometimes to be able to turn off the scoring facility, especially if you think that it could cause too much anxiety in a particular child. A more detailed record of the learner's progress is very useful for the teacher as a diagnostic aid, and can be the subject of discussion between the teacher and the learner at a later stage. It ought to be available as an option since it can sometimes be seen as 'spying' and ought not to be used without the pupil's knowledge.
- 8.1.10 Work cards, references for private study, art and craft, drama and so on are all activities which can be used to follow up a tutorial or a drill and practice program. Some of the best program packs contain a whole range of ideas like this which will help you to integrate the program fully into the normal range of classroom activities.
- 8.2.3 Each frame needs to be simple enough for the user to be almost guaranteed success, and the frames must be presented in a logical sequence. Whenever a difficulty arises, it should be possible to revise or to be automatically sent round a remedial loop until the point has been clarified and understood. When input is required from the learner, it is important that the program is sufficiently versatile to accept answers in a variety of forms, even to the extent of catering for the more common spelling mistake if accurate spelling is not the major purpose of the activity.
- 8.3.2 Obviously the more levels of difficulty available in a program, the more use you will have for it. Also, any one pupil will be spared the boredom of working through the same examples over and over again. This is further aided if the examples themselves are randomly generated so that they never follow a set sequence.
- 8.4.1 It is a good thing to be able to refer to the instructions while the program is running.

- 8.4.4 Especially in the case of matching, sequencing and reading exercises, it is useful to be able to preview the content in the form of a word or sound list. Some programs will allow you to make changes or additions to this list, which of course makes them more versatile. If they do not, then you must decide whether the list is sufficiently comprehensive for your purposes.
- 8.5.6 Sometimes complicated simulation games take longer to complete than you have time available. It is very frustrating if every time, you must start again from the beginning. If the current game can be saved on disc, next time the players just start where they left off.
- 8.5.7 Suggestions for follow-up work which include a wide range of other activities may be very helpful in getting the pupils to relate their work with the computer to their everyday experiences.

APPENDIX C

INSTRUCTIONS:

NAME/CODE:

1. Complete the following questionnaire giving as much detail as possible. Think carefully about each question before answering.
2. Be absolutely honest and write down exactly how you feel.
3. If you need more space, use the additional paper provided at the end.
4. Could this questionnaire please be handed back to me by **5 August 1991**.
5. CAL stands for computer assisted learning. This is the mode in which we have been using the computer in the classroom.
6. I am aware that this will demand a considerable amount of your time and I would therefore like to express a special word of thanks to you for your co-operation.

GENERAL

1. Do you feel that there is any threat whatsoever that the computer can replace you as a teacher? YES/NO (Underline your choice)

2. Is one computer effective in the classroom? YES/NO
Please motivate your answer.

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3. Should each classroom have a computer or is it effective enough to circulate one between two classes?

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4. Would it be more effective to have a computer room for the purposes of CAL (computer assisted learning)? YES/NO

5. Is CAL an effective method of learning? YES/NO

6. Do computers have other roles to play in education? YES/NO.
Please motivate your answer.

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- 7. Should the school make more money available for the purchasing of CAL programs? YES/NO
- 8. Would you like the computer to be used to do your reports, schedules, and other administrative tasks? YES/NO
- 9. Would you be prepared to feed in the information pertaining to your class or should somebody be appointed to do this for the whole school?

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- 10. Would you like to be able to use a wordprocessor for your own schoolwork? YES/NO
- 11. Should the emphasis of the use of computers in the school be on computer literacy or CAL or should there be a balance?

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- 12. Please motivate your answer to question 11.

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- 13. Has the use of the computer in the classroom affected your class control? YES/NO. Please motivate.

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14. Did you need to bring about any changes to your classroom organization and teaching methods in order to incorporate the computer into your teaching? YES/NO. Please motivate.

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15. Was it worthwhile to make these changes so that the computer could be used? YES/NO.

16. Have you used a system of evaluation to determine whether the programs used have in fact improved learning? YES/NO.

17. If you answered 'yes' to question 16, have the programs improved learning? YES/NO.

18. Does the use of the computer in the classroom demand more of your time? YES/NO. Please motivate.

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19. Do you feel that your creativity plays a role in the use of the computer? YES/NO.

20. Do you feel that the computer is a cold and impersonal method of teaching? YES/NO.

- 21. Is it important to plan thoroughly when using the computer in the classroom? YES/NO. Please motivate.

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- 22. Did the computer give you the opportunity to individualize more easily? YES/NO.

- 23. Do you feel that the computer could result in the need for less teachers? YES/NO.

PUPIL INVOLVEMENT:

- 24. Did every pupil have sufficient time on the computer? YES/NO.

- 25. Is it essential that all pupils have the same amount of time on the computer? YES/NO. Please motivate.

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- 26. Is it effective to use teacher assistants (pupils)? YES/NO

- 27. Has the fact that pupils could break the computer placed any restrictions on you using the computer in the classroom? YES/NO.

- 28. Did you at any time feel threatened by the pupils who had more knowledge about computers than what you did? YES/NO.

- 29. Do you think that it is essential that the pupil must know the keyboard before CAL can function effectively? YES/NO.
- 30. Which group of pupils benefitted the most from the computer?
BRIGHT/WEAK/BOTH
- 31. Does the computer motivate pupils in any way? Please elaborate.

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- 32. How did the children in your class benefit from the computer?

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IN-SERVICE TRAINING:

- 33. Would you be at this stage be able to evaluate educational software without having to refer to the evaluation questionnaire?
YES/NO.

- 34. Is the questionnaire used to evaluate software comprehensive enough? YES/NO. If not, what should be added?
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- 35. Should we have spent more time evaluating the programs together before using them in the classroom? YES/NO.

- 36. Is it essential to evaluate the programs in such detail before using them in the classroom? YES/NO. Please motivate.
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- 37. Did the in-service course increase your confidence to use the computer for CAL? YES/NO. If not, please give your reasons.
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42. What do you suggest should be included in the in-service training program?

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43. What do you feel should be excluded from the in-service training program?

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44. Did you have enough time to use one specific program with confidence before you were confronted with the next one?
YES/NO.

45. Should I have started the training with the mathematics program or was the spelling program appropriate? Please motivate.

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46. Do you feel that it is important that the in-service training is provided by a staff member? YES/NO. Please motivate.

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47. Do you feel that time should be made available on the timetable for in-service training? YES/NO.

48. Has the in-service course made you more aware of the role of CAL in the classroom? YES/NO. If yes, what do you understand by CAL?

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49. Do you think that this method of in-service training could be

used to get all the teachers on the staff to use the computer for CAL? YES/NO.

- 50. Was the idea of working in class groups a good one? YES/NO. Please motivate.

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- 51. Considering the number of computers available, should more teachers have been included in the in-service training course? YES/NO.

- 52. My intention now is to introduce you to further programs as they become available. Do you think that this will be an effective way of ensuring that computers will continue to function effectively in the classroom? YES/NO.

TO SUM UP:

- 53. A PTA meeting is to be held. You have been asked to address the meeting about the in-service training course and the use of the computer in the classroom for the purpose of CAL. What would you say?

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APPENDIX D

IN-SERVICE TRAINING : COMPUTERS
INDIENSOPLEIDING : REKENAARS

STD/ST.	DATE/DATUM	DAY/DAG	TIME/TYD	VENUE/PLEK	ACTIVITY AKTIWITEIT
2	15/4/91	MON/MAAN	15:30 -	CLASS ROOM KLASKAMER	SHARING DEEL PUPIL INVOLVEMENT LEERLING DEELNAME
	29/4/91	MON/MAAN	15:30 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME MATHS WISKUNDE
	20/5/91	WED/WOENS	14:00 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME LEES

INTERVIEWS
ONDERHOUDE

Teacher A	Third Term
Teacher B	Derde Kwartaal
Teacher C	Derde Kwartaal

PUPILS/LEERLINGE

27/5/91	MONDAY	MORNING
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OBSERVATION IN CLASSROOM
OBSERVASIE IN KLASKAMER

2/SPES 13 MAY/MEI - 17 MAY/MEI

IN-SERVICE TRAINING : COMPUTERS
INDIENSOPLEIDING : REKENAARS

STD/ST.	DATE/DATUM	DAY/DAG	TIME/TYD	VENUE/PLEK	ACTIVITY AKTIWITEIT
3 SPES	16/4/91	TUES/DINS	16:30 -	CLASS ROOM KLASKAMER	SPELLING SPEL SHARING DEEL PUPIL INVOLVEMENT LEERLING DEELNAME
	21/5/91	TUES/DINS	16:30 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME MATHS WISKUNDE
	28/5/91	TUES/DINS	16:30 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME LEES

INTERVIEWS
ONDERHOUDE

Teacher D	Third Term
Teacher E	Derde Kwartaal
Teacher J	Derde Kwartaal

PUPILS/LEERLINGE

28/5/91 TUESDAY MORNING

OBSERVATION IN CLASSROOM
OBSERVASIE IN KLASKAMER

20 MAY/MEI - 24 MAY/MEI

IN-SERVICE TRAINING : COMPUTERS
INDIENSOPLEIDING : REKENAARS

STD/ST.	DATE/DATUM	DAY/DAG	TIME/TYD	VENUE/PLEK	ACTIVITY AKTIWITEIT
4	17/4/91	WED/WOENS	14:00 -	CLASS ROOM KLASKAMER	SPELLING SPEL SHARING DEEL PUPIL INVOLVEMENT LEERLING DEELNAME
	22/5/91	WED/WOENS	15:00 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME MATHS WISKUNDE
	29/5/91	WED/WOENS	14:00 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME LEES

INTERVIEWS
ONDERHOUDE

Teacher F Third Term

Teacher G Derde Kwartaal

PUPILS/LEERLINGE

29/5/91 WED/WOENS MORNING

OBSERVATION IN CLASSROOM
OBSERVASIE IN KLASKAMER

27 MAY/MEI - 30 MAY/MEI

IN-SERVICE TRAINING : COMPUTERS
INDIENSOPLEIDING : REKENAARS

STD/ST.	DATE/DATUM	DAY/DAG	TIME/TYD	VENUE/PLEK	ACTIVITY AKTIWITEIT
5	18/4/91	THUR/DON	16:00 -	CLASS ROOM KLASKAMER	SPELLING SPEL SHARING DEEL PUPIL INVOLVEMENT LEERLING DEELNAME
	25/4/91	THUR/DON	16:00 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME MATHS WISKUNDE
	23/5/91	THUR/DON	16:00 -	CLASS ROOM KLASKAMER	PROBLEMS PROBLEME LEES

ONDERHOUDE

Teacher H Derde Kwartaal

Teacher I

Derde Kwartaal

LEERLINGE

6/6/91

THURSDAY

MORNING

OBSERVATION IN CLASSROOM
OBSERVASIE IN KLASKAMER

27 MEI - 30 MEI

APPENDIX E

MY APPROACH AT THE PREVIOUS SCHOOL

I have included this chapter because I am sure that aspects contained herein could be of value to the reader. Due to the fact that I left the school before I was able to complete the task, I was unable to come to any definite conclusions. The reader will however notice that there are aspects which correlate with what was written in chapter 6.

As nobody at the school had had any experience with computers, the headmaster told me to continue as I wished and he would support me all the way. It is important to note that the headmaster had a lot of knowledge about computers, but being newly appointed at the school, he did not have the time to become involved at that stage.

I approached the in-service training in the following manner. Because of the attitude of the teachers towards the computers in the school, I thought that the best approach would be to give the teachers something which would help them personally in their own schoolwork. Many of them expressed that they would like to be able to use the computer for their schoolwork in the same way as what I was able to do so. I therefore decided that we would start with using the computer as a tool and then move to the other roles of tutor and tutee at a later stage. It was in any case, as I was

soon to learn, the intention of the headmaster to use the computers at the school as a tool. I asked one of the teachers whether he was interested to learn how to use a wordprocessor. His immediate reaction was that he would like to but that he was hesitant. We then sat down together and I explained what it would involve and he became very keen. The very next day a second teacher came to ask me whether he could also attend the course. The three of us felt that I was to approach the primary school staff members and ask each one individually whether he/she would like to attend the course. I did this personally and they were all keen. What really excited me was that teachers who were anti computers were now keen to participate. Here I feel that the approach was correct. The computer was not being forced upon them. The choice was entirely their own. Some of the high school staff members were also keen to attend but with limited facilities I was unfortunately unable to accommodate them. The course was attended by three junior primary teachers and three senior primary teachers.

The next problem was when. The only suitable time for everyone was a Wednesday evening for one hour. At this stage this seemed to be a suitable arrangement because the teachers wanted practice time between lessons.

The questionnaire (Appendix A) was given to each member at the

first lesson. The teacher responses gave me an indication of how the teachers felt and this acted as my guideline as to how to go about presenting the course. We started slowly and this approach built up the confidence of the participants. They practised between lessons and some of the teachers said that they would have liked more than one lesson per week. They assisted each other at the practice sessions and there was an atmosphere of excitement. After each lesson the participants had to evaluate the lesson critically so that I could improve my approach if necessary. This they did in writing and handed it in by the following lesson.

My objective was that once they had full confidence in the use of the wordprocessor we would move onto another aspect such as a database so that eventually they would be in the position to use the computer in more ways than one.

As was to be expected, parent pressure started. The parents wanted to know when we planned to get the pupils involved with the computers. It was my intention to first train the teachers thoroughly before they were expected to do the same with the pupils, but it was becoming evident that the parents were not prepared to wait so long.

I asked the teachers who were attending the course if they would

be prepared to assist with the pupils. At that stage the headmaster said that a computer club was to be established and that the pupils who wished to receive courses in the use of the computer would be expected to pay. This would enable the school to purchase more computers. A meeting was arranged with the parents of the school and they said we could go ahead. Two of the teachers were prepared to assist with the running of the course. The others said that their programs were full and at that stage and they would not have the time to do so.

Due to the pressure, we were now compelled to move faster which I would have preferred not to do. The headmaster gave us the following curriculum which included some aspects of computer literacy:

Objectives for the junior primary

1. To teach pupils the correct way of handling disks.
2. To teach pupils the correct way of booting the computer.
3. To teach the keyboard essentials by using games.
4. To teach pupils to use easy applications program.

Objectives of the senior primary

1. To make pupils aware of the possibilities provided by modern technology.

2. To teach pupils the correct way of handling the hardware.
3. To make pupils aware of the components of a computer and the terminology.
4. To teach pupils the difference between a systems disk and a data disk.
5. To teach the pupils a few DOS commands
 - 5.1 Formatting
 - 5.2 Calling up a directory
 - 5.3 Copying
 - 5.4 Deleting
6. To teach pupils how to use an applications program - eg. Printmaster.
7. To teach pupils Logo.
8. To teach pupils wordprocessing.

Syllabus of junior primary school

1. Hardware
 - 1.1 The different components of a computer
 - 1.2 The correct way of handling disks
 - 1.3 Booting up a computer

2. The keyboard
 - 2.1 The escape key; the directional keys; the numeric keys - Any games

- 2.2 The space bar; the function keys - Learn the alphabet
- 2.3 Starting a game by entering the correct command
- 3. Application program - Printmaster
 - 3.1 The loading of the program
 - 3.2 Creating a simple poster
 - 3.3 Adding a border
 - 3.4 Adding graphics
 - 3.5 Adding text using a simple font
 - 3.6 Previewing the poster
 - 3.7 Printing the poster

Syllabus for the senior primary

- 1. Hardware
 - 1.1 The different components of the computer
 - 1.2 Disks and the handling thereof
 - 1.3 The difference between a systems disk and a data disk.

- 2. MSDOS
 - 2.1 The function of MSDOS.
 - 2.2 Calling up a directory.
 - 2.3 The difference between intrinsic and extrinsic commands.
 - 2.4 Diskcopy
 - 2.5 Wild cards
 - 2.6 Copy

2.7 Delete

3. Printmaster

3.1 Loading the program.

3.2 Poster

3.3 Card

4. Logo

4.1 Loading the program

4.2 Turtle Graphics - elementary drawings and figures from direct instructions.

4.3 Using sub-routines to draw drawings

4.4 Using variables in a sub-routine.

5. Wordprocessing

5.1 Loading the program.

5.2 Typing of various exercises.

This curriculum was given to the teachers and they were expected them to continue on their own. As could be expected, the teachers were all for withdrawing. I told the headmaster that we would use the curriculum as it was but would make recommendations for the future as we went along. The teachers now felt more confidence and were enthusiastic to get going. Our objective was to be three lessons ahead of the pupils. Every lesson was worked out in the

finest of detail. The teacher practiced exactly what they were going to do with the pupils.

I would have preferred to have taken the following approach. The headmaster, the teachers and I had to sit down together and work out a workable strategy to follow. We had to decide together what we thought was necessary for children of various ages to know. In other words, a curriculum had to be drawn up. This needed a lot of thought and careful planning. I felt that it was essential to involve the teachers in this so that they would feel part of the overall planning from the beginning. The reader must always bear in mind that I was working with people who had had very little experience with computers and who were still uncertain of themselves.

The situation in which we found ourselves was that there was not sufficient time for the teachers to be trained thoroughly in what they had to do. We managed to do certain parts of the curriculum with the pupils, but when the time came for me to leave the school, we were nowhere near what we had set out to do.

The experience which I gained at that school played a major role in my approach towards in-service training as set out in chapter 5.