

Computer Inservice Education For Teachers: A Collaborative Whole School Approach

By

Ken Ryba
Bill Anderson & Mark Brown

Massey University
Palmerston North

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The success of any new educational innovation ultimately depends upon the support and attitudes of the teachers involved. As early experiences with computers in education have revealed, it is absolutely essential to gain teacher acceptance and active involvement in using the new technology. Unfortunately, many early efforts to utilise computers in education tended

to focus on the machine effects rather than the people effects (Ryba, 1991). In other words, attention was primarily directed at the machinery and how to create programs that would 'fit' the requirements of the computer rather than the requirements of the learners and the curriculum. Teachers often resisted new technology because they did not feel confident using it and did not see its relevance for improving teaching and learning.

Computer education in New Zealand has been characterised by a lack of commitment to the systematic introduction of computers into schools and the absence of any formal policy by government. Accordingly, educational computing in New Zealand has proceeded on an ad hoc basis with individual schools largely being responsible for the acquisition of computer resources and the training of teachers. Perhaps not surprisingly, the unsystematic introduction of computers into schools has given rise to a number of computer-related problems. These include: (1) insufficient numbers of computers; (2) insufficient training and educational opportunities for teachers; (3) lack of knowledge and skills about using computers; (4) a lack of software for teaching and learning; and (5) inadequate financial support (Nightingale & Chamberlain, 1991). Case studies on the use of computers in New Zealand schools have also confirmed the absence of specific patterns of training for teachers and a lack of information on how to integrate the use of computers to enhance learning across the school curriculum (Chamberlain and Kennedy, 1991).

Teachers who lack experience and training have cause to feel anxious when confronted with the requirement to utilise computers in the school curriculum. Indeed, it has been noted that teachers often exhibit higher anxiety levels regarding the use of computers than do their students (Cambre and Cook, 1984, cited in Woodrow, 1991). Accordingly, it is important to provide opportunities to help teachers overcome their fears and negative attitudes toward computer use. The advent of more "user-friendly" computers and software that can easily be applied across a range of curriculum areas has helped to diminish many of these concerns. At the same time, however, the removal of the anxiety barrier is not sufficient on its own to guarantee the success of computer education in schools. Teachers need to be able to exercise control over implementation of programmes and to perceive that computer use is relevant to meeting their own learning needs as well as the needs of their students (Woodrow, 1991). As Wedman and Heller (1984) have noted, concerns about the integration of computers into the curriculum can be reduced when the majority of the school's teachers are involved in the process and committed to computer utilisation.

Teacher commitment and active participation is well illustrated by the Christchurch College of Education "Computers in Classrooms" Project (Ministry of Education, 1991). This Project invited each school to send at least two participants for inservice training. Schools were asked to make a commitment to the Project by financing teacher release days and providing their own computer equipment. Teachers also had to make a commitment of their own time to familiarise themselves with some particular software and to then incorporate this into a unit of work with their class. Teachers

were organised into "clusters" of about 10 in each locality and given a first workshop at which they were introduced to the programme and asked to define what they wanted to achieve. Each teacher was then given tuition on the use of software and methods that were appropriate for the purpose. This instruction was provided in a convivial learning environment where teachers had a chance to help and support one another. Having developed some skills and worked out a strategy for using computers, teachers returned to the classroom to try out their approach for the next three weeks. During this time, two classroom visits were made by a project tutor to provide help and

to see the unit in action. Finally, the participants attended another cluster workshop to evaluate what had been achieved, to share experiences, and to ask themselves "where to from here". Certificates of attainment from the college were awarded to participants who completed the programme.

A notable feature of the Christchurch Project was the opportunities provided for teachers to define their own goals and to receive personal support in the actual teaching environment where it was needed. Likewise, our own research with teachers has shown that inservice education was effective when it involved informal, individualised learning of some immediate practical application. For example, teachers who learned how to use a simple word processor were quickly able to apply this with their students. Also, teachers who were taught basic turtle commands in logo could immediately use this for generating group activities in reading, mathematics, and problem solving (Nolan and Ryba, 1987). As Carroll (1990) has advocated; "teach people what they need to learn in order to do what they wish to do". This involves three specific aspects: (1) allowing learners to start immediately on realistic tasks; (2) reducing the amount of reading and other passive forms of training; and, (3) helping to make errors less traumatic and more pedagogically productive (Carroll, 1990). In sum, it is essential to consider both the task demands and social practices of teacher education. The effectiveness of inservice teacher education is likely to be enhanced through the creation of support networks in which teachers feel able to help and support one another as they learn how to use particular computer applications.

PURPOSE

The purpose of this study was to examine the effects of a whole-school approach to inservice teacher education. The basic principles of the approach were that teachers would define their own learning needs and be in control of all decisions related to computer use within their classroom. Specific training and educational aims of the project were to:

- (1) provide personally relevant learning experiences on an individual basis to each classroom teacher;
- (2) provide all computer equipment, software and support for a definite

time period (six weeks) in order to accomplish the personal aims identified by teachers; and,

(3) provide successful learning experiences through active involvement of teachers in relevant and easy-to-use computer applications.

The project was designed to examine two main questions. First, what priorities do teachers have concerning their own computer learning needs? Second, to what extent do teachers perceive that this approach to inservice education as enhancing their confidence and skills in using a computer to support students learning?

The overall aim was to create what might be called a computer learning culture within the school. If it occurred, this would be characterised by teachers sharing information and helping one another to make effective use of the computers. Likewise, the effects would be notable in terms of students helping and supporting one another to learn how to use the computers in their classrooms. The practical nature of the project lent itself to an ethnographic case study approach. This involved the documentation of project outcomes through analysis of teacher and student interviews, work samples, teacher questionnaires, and reports from individual facilitators (university students) on activities undertaken in the classrooms. An ancillary goal was to provide experience for computer education students in assisting teachers and pupils to use specific computer applications.

METHOD

Teachers at College Street Primary School in Palmerston North were invited to participate in a Whole School Inservice Project sponsored by Massey University, Department of Education. The goal of the project was to provide inservice training and education to all teachers on an ongoing basis within their classrooms. Teachers were initially asked to complete a questionnaire indicating the personal skills and experiences they wanted to acquire through the project. Teachers were then divided into three groups based on their interests and skill level. Each group was supervised by one of the three authors. A meeting was held with each group to assess their needs in terms of hardware, software and professional support.

Twenty seven University students enrolled in a course on computers in education served as facilitators/trainers. They were assigned to work with a particular teacher for four weeks, providing 4-8 sessions of support at mutually agreed times. Two or three of these facilitators worked in each classroom on a project or activity selected by the teachers (e.g. word processing and publishing, Logo programming, database applications, CAI). Each classroom was equipped with one or two computers (Apple 2e and Macintosh) for the six week duration of the Project. Teachers were then

asked to complete a questionnaire evaluating the outcomes of the Project in terms of meeting their own learning needs and the needs of students. Facilitators/trainers wrote a report on approaches to the use of computers and work undertaken with students within each classroom.

RESULTS AND DISCUSSION

Pre-Project Teacher Questionnaire

Six of the teachers indicated that they had prior experience with using computers in education. Three of these teachers had previously taken a course in educational computing. The remaining six teachers indicated that they had little or no experience with using a computer.

Teachers varied considerably in terms of the personal skills and experiences that they hoped to develop through the project:

- 2 - greater awareness of programs for young children
- 3 - skills relevant to classroom management of computers
- 1 - ability to use a computer in language, reading and mathematics
- 1 - basic knowledge - how to publish stories
- 1 - knowledge of range of software available
- 1 - organisation for giving all children access
- 1 - uses for children with special needs
- 1 - uses of databases and spreadsheets
- 2 - word processing and logo programming

When asked what type of support teachers would like to have, most indicated the need for personal practice in using software and in-class assistance working with children:

- 1 - help with publishing stories, maths games, adventure games
- 1 - examples of child-centred lessons and in-class assistance
- 5 - personal practice in how to use the software
- 2 - refresher course on how to use the computer and software demonstrations
- 3 - in-class assistance working with children
- 1 - integration of computers into the curriculum

Computer-Related Classroom Work Undertaken

Following completion of the questionnaire, teachers met with the authors to decide on arrangements for their classroom. They selected software from a range of options provided and were assigned two or three facilitator/trainers to assist them in the classroom. Six of the teachers

selected Children's Writing and Publishing™ on the basis that this would provide a relevant introduction to computers for them and for the children in their classroom. Two teachers selected a database program as they

considered this to be appropriate for work in social studies/science with senior students. The remaining five teachers used a range of software (Logo, adventure games, CAI).

The writing and publishing program proved to be an excellent choice for introducing teachers and children to the computers. In the week prior to the Project, two of the teachers who knew how to use the program volunteered to show the others how to operate the program and print stories. The result was that all six of the teachers quickly became confident in their ability to use this program and decided to incorporate it into their classroom activities. The teachers met together and decided to use a cooperative group approach to working with the computer. This involved two or three students working together on the computer, composing the story, selecting graphic pictures, and deciding on the layout.

Three of the teachers decided to use Logo programming as an introduction to the computer as a problem solving tool. These teachers had some prior experience with Logo and wanted to study its application for teaching maths concepts in the classroom. The facilitator/trainers assisted teachers by setting up a schedule for computer use and helping students to plan and write procedures during off-computer time. The facilitator/trainers directly taught students to use Logo commands and also set up peer tutoring situations with the aim of encouraging students to help one another with their learning. They worked with individuals and small groups of students and set homework tasks to be completed prior to the next session. When the authors visited the school, students would proudly display their latest written plans and then illustrate how these worked on the computer. Students were enthusiastic about Logo and would often help one another when programming or design problems were encountered.

Two teachers selected database activities as an introduction to computers with year 5 and 6 students. The intention was to relate the database activities to areas of the curriculum. Unfortunately, however, as teachers had minimal involvement in the classroom computer work, it was left to the facilitator/trainers to undertake most of the student instruction. The teachers did facilitate the collection of information for a datafile on "our class" (sex, height, hair colour, eye colour, etc.). The facilitator/trainers first showed students how databases were organised and how they could be used for accessing and organising information. They then taught them how to use an existing database for problem-solving. Students were also taught how to add information to a datafile and how to create datafiles of their own. With the help of the facilitator/trainers, students undertook projects to create datafiles on topics of interest (e.g. "favourite biscuits", "types of airplanes"). The aim was to encourage the children to focus on the processes of thinking and using a database for problem solving rather than upon studying the content of the material.

Learning Outcomes For Teachers: Post Project Questionnaire and Interviews

At the end of the six week Project, teachers were asked to complete a questionnaire indicating whether the Project had enabled them to accomplish their personal goals concerning computer use. The results were generally quite positive, indicating increased confidence and awareness of computer uses to promote student learning. For example:

Selected Teachers Comments On Accomplishment of Personal Goals

"I am now able to teach and extend childrens' thinking through the use of LOGO."

"I have become familiar with how to use the computer in an integrated approach to the curriculum."

"I developed a technique for allocating computer time and getting experienced students to help others."

"I was able to revise previously learned skills and learn more about available software."

"It allowed me to try various methods of use--roster, groups, parts of programmes. The students provided me with new ideas and suggestions."

"I took a mouse on a test drive and was able to acquaint myself with software."

"It confirmed my ideas about how valuable computers are in the classroom."

"Organisation of the classroom meant that we got maximum utilisation of the computer."

"It helped me to become familiar with a wider range of software available for this level."

"I realise LOGO is quite sophisticated for this level and we need more teacher support for the children."

"Having the computer in the classroom enabled me to use it before and

after school."

Bearing in mind that most of these teachers had little or no previous computer experience, it is notable that they reported such positive learning outcomes within their own classrooms.

In addition to the provision of computers and direct assistance within classrooms, it was quite evident that teachers were encouraging and supporting one another to use the computers. For example, one computer was permanently set up in the staff room for printing out stories and previewing software. A selection of software, books, and other material was also left with the computer so that teachers could try out programs or demonstrate what they had learned to one another. It was notable that when teachers learned how to use a particular program (e.g. Logo and Childrens' Writing and Publishing), they would frequently undertake to "show and tell"

their colleagues about newly acquired skills and knowledge. Overall, the school became computer active and this had some important social learning effects in terms of the ways in which teachers interacted with one another.

Examples of Teachers Helping and Supporting One another

- exchanging software between classes
- helping a colleague to print out stories
- helping a colleague to learn a new program
- explaining how to set up cooperative learning groups
- showing childrens' work and discussing ideas for future class projects

While several of the facilitator/trainers expressed concern that teachers had not actively participated in the computer classroom activities, the questionnaire responses and follow up interviews indicated that virtually all of the teachers felt more confident about using computers to support students learning. For many of the teachers, this was the first time that they had been able to observe firsthand their students working with computers. A key point seemed to be that teachers had an opportunity to observe and make decisions about how the computers would be used in their classrooms without being required to have any special knowledge about the technology. They could comfortably work alongside or observe their facilitator/trainers at work and get involved in whatever ways they chose to. Moreover, positive interdependence was evident in the ways in which teachers helped and supported one another. This probably helped to minimise any anxiety on the part of teachers about their ability to use the technology.

Learning Outcomes For Students

Teachers reported many comments on the apparent learning benefits for children. For example:

Selected Comments on Learning Benefits For Children

"My class learned so much through using the LOGO program. Many cooperative skills were learned in addition to the LOGO skills. It gave some children the chance to flourish in an alternative field."

"In this room, all children learned how to load, use the word processor, save, and print. All pupils produced their own newsletter."

"All children in my class had a turn to learn simple keyboard skills, they all published a story, and had free time to play games." "All children definitely learned new skills. I found that my ESL children and slow readers enjoyed a new independence while quicker children were able to stretch themselves--perfect."

"They absolutely gained skills and experience in keyboard skills, social skills, alphabet skills, and early math skills."

"Language skills--explaining to another child how to use the computer program. Social skills--assertiveness and tolerance."

"The children enjoyed alphabet reinforcement games and keyboard familiarity certainly increased. It also reinforced upper/lower case recognition."

"We used LOGO. Some developed procedures involving planning ahead."

"It taught them the basics of how to use a computer. The children were then able to use it without help after they had received tuition."

The increased computer activity within the school led to the creation of what could be called a computer learning culture . This was evident through observations of the ways in which people supported one another and celebrated the achievements of teachers and children. It was interesting to observe, for example, the obvious pride and personal value that junior class students derived from publishing their newsletters, stories, and books. In turn, the teachers expressed a sense of pride and purpose that their students were capable of such good quality work. Later when the authors talked with the principal, he beamed as he explained how the children came to him in groups to show off their productions. It was apparent, he said that the children truly valued one another and the chance to learn together in their publishing groups. The computer naturally lent itself to this type of collaborative work.

Not all learning outcomes within all class situations could be described as positive. For example, facilitator/trainers expressed concern that little or no effort was made by some teachers to integrate the computer activities into the school curriculum. Many of the University students were "left to it" by teachers to undertake computer education in isolation from other forms of learning (e.g. LOGO and database applications). It was notable, however, that facilitator/trainers reported that virtually all of the students benefited in terms of their own skills and confidence in using the computers even when the activities did not readily fit within the classroom programme.

Concern was expressed by facilitator/trainers regarding the need for teachers to put more effort into building childrens' social skills so that they could work more effectively within cooperative groups. Constraints of time (6 weeks) and computer equipment (one per class) were definitely important factors in limiting the amount of training and cooperative work that could be undertaken.

Notwithstanding some of the limitations noted above, children reported a lot of enthusiasm for their work with the computers during the course of the Project. Likewise, teachers and parents became actively aware of the benefits that could be obtained from incorporating computers into the classrooms. In fact, immediately following completion of this demonstration Project, the Board of Trustees approved the purchase of several computers

with the eventual aim of providing one for every classroom!

Learning Outcomes For Facilitator/Trainers

The computer education student facilitator/trainers produced some excellent reports on their work with teachers and children that went well beyond the requirements of their assignment. They were asked to document the procedures they followed for consulting with teachers and the teaching and learning methods used in the classroom. They were asked to critically evaluate the work undertaken, apparent learning benefits and problems experienced. Nearly all of the University students offered positive comments on how this practical experience had equipped them to make more effective use of computers in the classroom.

Selected Comments on Learning Benefits For Facilitator/Trainers

"I now have a better understanding of how to implement a database application in the classroom and also a better understanding of applying the theory to practice."

"I feel that I have a better understanding of where computers and I fit into the classroom environment and curriculum."

"I can see from my experience that having a piece of work published and printed out professionally is very stimulating and highly motivating for children."

"I now feel confident in saying that it is more beneficial for children to work cooperatively on the computer rather than by themselves."

While several student facilitator/trainers expressed disappointment that some teachers were not more directly involved in the Project, it was apparent that the learning experiences had been valuable for them. Moreover they were able to study aspects of the children interacting with one another--the dialogue that occurs within cooperative learning groups.

Again, a notable outcome were the people effects that emerged through the Project. There was a sense of celebration about the achievements of children and teacher alike. Some teachers were so impressed with the contribution of the computer education students that they took it upon themselves to write letter of commendation to the course lecturer. Perhaps, not surprisingly, what we have discovered through the course of this Project is that--it is not the features inherent in the computer but what

people do with the technology that determines its effectiveness in teaching and learning.

CONCLUSION

Experiences gained in this project indicate that a whole school inservice approach is likely to create the climate for greater acceptance and use of computers in the classroom than might be achieved through traditional forms of teacher inservice education. Several sources of teacher education are now available, including: (1) university and teachers college courses; (2) commercial computer firms; (3) computer-using teachers from within the school; (4) computer-using teachers from other schools; (5) educational computing advisers; and, (6) private computer education consultants. An important feature of this Project was to directly involve the principal and staff in making decisions about the inservice teacher education approach. The main rationale for a collaborative whole school approach to inservice teacher education is that it helps to provide the right conditions for creating an active computer learning culture within the school.

Learning outcomes of this and other projects suggest a number of ingredients that are needed to ensure successful computer inservice education for teachers.

1. Ask Teachers To Identify Their Own Needs

The process of asking teachers to indicate what they would like to achieve for themselves and the resources they would like to have in order to attain these personal goals proved to be invaluable. Teachers in this Project varied considerably in skills and experience. It was thus essential that they feel comfortable and able to request assistance at the level they required on tasks that they deemed to be relevant for them.

2. Conduct the Inservice Teacher Education In The Actual Classroom Environment

If teachers are given education/training and support within their classroom, then there is no problem with them transferring skills and knowledge from one situation to another. They are able to set up the computer in a way that suits them and feel that they are making immediate progress with students in their own class. Several teachers in this Project stated that an important learning outcome for them was to explore different applications and make decisions on how to fit the computer into the curriculum and other classroom activities.

3. Teachers Should teach Teachers

Teachers are likely to be most responsive to others who have a similar

range of skills and experiences. Inexperienced teachers are likely to be most at ease and willing to learn when working with others who have only a little more experience than they do. Within this Project, teachers and student teacher-facilitators helped one another to learn how to use the writing and publishing program and other software. Several teachers in the final interview commented on the importance of this collegial support.

4. Teacher Educators Should Be Facilitators of Learning

The inservice is likely to be most effective when the teacher educator takes on the role of facilitator-of-learning rather than provider-of-information. In their role as facilitator, the teacher educator should help to ensure that teachers immediately get to use the computer in ways that are realistic and meaningful to them. The facilitator should encourage teachers to help and support one another rather than providing direct instruction. For example, teachers in this Project tutored their colleagues and demonstrated what they had learned.

5. Teachers Should Actively Participate During the Inservice

There needs to be a balance between formal and informal learning. Many teachers learn best when they can have actual hands-on experience on an informal basis. For example, in this Project a computer was located in the staff room for demonstration and training purposes. Teachers used this to preview software and to show one another how to operate programs. Such informal interactions can often result in more effective learning than scheduled presentations and demonstrations.

6. Follow-up Support Is Necessary

Collaboration amongst teachers helps to ensure the formation of an ongoing support network. The provision of this support is likely to be the single most important factor contributing to the successful implementation of new ideas and materials (Clemente, 1991). In this Project, ongoing consultation and collaboration with all of the staff from the outset led to a climate in which teachers felt comfortable asking for assistance and sharing information.

Finally, it needs to be stressed that the people effects in inservice work are as important as the computer effects. The promotion of positive interdependence amongst the staff--helping and supporting one another--is a key component for success. Every effort should be made to have the staff themselves identify and respond to their own needs within a supportive environment. This will require 'creative' approaches to inservice teacher education within classrooms where teachers can directly apply their skills and knowledge about how to use computers to enhance students' learning.

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