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The Victorian State Computer Education Committee's *Seeding Pair* In-service Program: Two Case Studies

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Abstract: Following the introduction of microcomputers into schools in the late 1970s, National Policy was developed which focused on the use of computers in non-computing subjects. The Victorian strategy for the implementation of the National Computers in Education Program was the development of a week-long in-service course which aimed to develop *seeding pairs* of teachers who would act as change agents when they returned to school. This chapter looks back at the case studies of two schools which sent teachers to the in-service. The case studies were initially presented in a Master of Educational Studies degree at Monash University. This chapter looks back at the way that professional development was designed to bring about change in schools with respect to computer use, how two schools made use of the *seeding pair* teachers and what issues emerged as a result.

Keywords: change agents, professional development, in-service programs

1. Introduction

In 1970, as third form student at Xavier College, I was privileged to be able to do computer programming one period a week as part of the Mathematics curriculum. Under the guidance of our teacher 'Basher' we straightened paper clips to make holes in punch cards and place the cards carefully in stacks to send to a computer at Monash University. At one stage it was mooted that we might go on an excursion to see the machine but our hopes of doing that were dashed when we were told that the pristine environment which housed the computer would be compromised by a visit of thirty 14 year olds. It seemed that the closest any of us would get to a computer was the imagined ones in the pages of the *Fantastic Four* comic book.

However, within a few short years the development of the so-called microcomputers meant that computers could begin to come into schools [1]. From a comparatively modest, hobbyist beginning there was rapid change; so much so that by 1982 in Victoria a subject association, the Computer Education Group Victoria (CEGV) had been formed, a journal (COM 3) had begun and Computer Science had been accredited as a Year 12 subject [2].

Interest in the provision of computers in schools developed rapidly to the point where it became a focus of government priority. Following the election of the Federal Labor Government in 1983 the Commonwealth Schools Commission established the National Advisory Committee on Computers in Schools (NACCS) which, among other things, set aside money for the development of in-service courses [2]. School

education is largely a State Government responsibility which meant that “*while the Schools Commission’s Computers in Education Program was a Commonwealth initiative its delivery was via state instrumentalities*” [2]. As the program was to be administered in each state, there would be differences between the states and evaluation of the programs and their impact would be at the state level.

At the time I was looking around for the topic for my Master of Educational Studies project at Monash University. My supervisor, who was involved in the evaluations, suggested that I take part in the case study evaluations. The resulting project was a study of two schools which sent teachers to an in-service course which was part of the Victorian response to the National Computer Education Program. With each state given considerable latitude, the Victorian response, which began in 1984, was designed by officers at the State Computer Education Centre. The result was the deployment, in Stage 1 of a number of week-long courses [3]. Later, in 1985, a Stage 2 course was developed so that, between 1984 and 1986 over 2000 teachers attended courses on the applications of what were called, at the time, microcomputers. It is interesting and instructive to look back at what was a major professional development and change initiative at a turning point in education.

2. The Seeding Pair In-Service Courses

As indicated above, the in-service courses in Victoria were designed through the State Computer Education Centre (SCEC) to operate in two stages. Initially, schools were invited to send two teachers, one of whom had to be from a non-Maths or Science background and one of whom had to be female. The week-long in-service program was designed with the non-user in mind. It was hoped that the in-service would make these users proficient in computer use, break down barriers in the use of computers and provide an introduction to the range of software available. In terms of computer use the main aim for the non-user could be simply described as familiarisation [3].

In addition to having the teachers who attended the course become familiar with computers, the course planners had a second agenda. It was intended that the teachers who attended the in-service courses would act as change agents when they returned to their schools. This second agenda was a key driver about the selection of the teachers who attended from the school. The seeding pair teachers, as they were called, were expected to carry the seeds of what they learned on the in-service back with them to their school. It was intended that they would provide training at the school level on what could be done with the computers in the classroom. The idea was that the seeding pair teachers would use computers in their own teaching and preparation, contribute to future discussions and inspire and be of assistance to their colleagues in the use of computers. They would be expected to take part in policy development and make a contribution towards future directions in the use of computers in their school [3].

2.1 The Use of Computers in Schools

It was clear that there was a vision of what a good school would look like as a result of the *seeding pair* in-service. This vision was a reflection of the literature of the time. Whereas there was, by 1984, an established Year 12 Computer Science course in Victoria there was a concern that the use of computers was being held captive by specialist computer interests. Part of the concern at the time was that “*it appears that computers are increasingly becoming a sign of a ‘good school’ and that the acquisition by the school of computers has an important ‘symbolic role’*” [4]. The consequence of this was the seemingly unbreakable link between the maths/ science area and computers, the crowding of the timetable and the problem of adequate access for students and teachers. One of the battles of this time was between the dominant model of computers being housed in rooms or laboratories and the fear that this model was a barrier to others making use of the computers. This might not have been such a problem if the computer rooms in schools had remained empty of formal classes but, in fact, the opposite tended to be the case. It seemed that it was important to principals that such an expensive facility be fully utilised.

The link between computers and the maths and science areas led to fears that girls would be either excluded or less inclined to pursue computers. Typical of the concerns expressed at the time was the argument that, with respect to computing, “*teaching methods, content, classroom dynamics and lack of female role models all work to discourage girls from participating in this area*” [5]. It was not just the use of computers but how they were being used which was vitally important. There was a belief that computer use in education needed to move beyond the specialist study of the computer itself. This led to the debate about whether computers were better understood as tools or topics [1].

It was soon understood that any attempt at making educational use of computers across the curriculum was predicated on teacher development [4]. While one way to make use of computers in different subjects was to use packaged program, some critics thought that this had significant limitations on the kind of learning that was likely to take place and that it would be better and more effective if teachers designed the programs themselves [6]. At the same time there was much concern that there were insufficient software resources for teachers to use. Some writers thought that a program such as LOGO would have a major impact in a number of classrooms across a range of disciplines [7].

The emphasis on teacher development led to the second agenda of the in-service program: the role of the *seeding pair* teachers as change agents.

2.2 Change Agents

Arguably the most significant aspect of the *seeding pair* in-service program was their role as change agents in schools. It is sobering to look back to the early 1980s and see how much was already known about the effectiveness of professional development and how much was already understood about the difficulty of creating change in schools. It is fair to ask what lessons have been drawn from this work and how much has changed in practice over the last 30 years or so.

It was already well understood that one-off in-service workshops were ineffective, largely because, “*the absence of follow-up after workshops is without doubt the greatest single problem in contemporary professional development*” [8]. This was a crucial issue for the designers of the *seeding pair* in-service as the purpose of the course was to develop and change the way that computers were used in schools. A centrally designed course would be unlikely to have the desired effect of changing practice within the schools themselves.

What was understood to be more effective in terms of implementing programs in schools was peer interaction [8]. We would be likely today to describe this peer interaction in terms of mentoring or coaching and there was an emphasis in the literature of the day on developing in-service courses which were more in tune with what participants needed [9-11]. This meant that the in-service course needed to provide sufficient time to develop confidence in new practices.

For change to be effective, then, it is important to have people operating at the school who can foster and initiate change by facilitating the new practices. One obvious candidate for fostering change was the principal. However, educational research at the time demonstrated that the principal was not always best placed to either initiate or foster change as they spent a large part of their time maintaining stability rather than initiating change [8]. In any event, the principal hardly had time – then or now – to sit with and assist staff members in the development of new skills. Despite this important limitation of the principal’s time it was equally clear from the research that “Whether it is direct or indirect, the principal plays a fateful role in implementation and continuance of any change proposal” [8]. However, it is not possible for a principal to drive change without help:

Principals need to be knowledgeable about the goals and expected uses of an innovation in order to understand the needs, progress, and problems teachers experience during implementation. They may choose to undergo training and become users themselves and to provide teacher assistance directly. Their participation at that level is not essential however, so long as they provide access to resources, training, and assistance from others. Research indicates that principals often depend on assistance from a “second change agent” in the school—for example a vice-principal, a key teacher, or a central office consultant—especially in secondary schools. [8]

A key goal of the *seeding pair* program was having people in the school who could assist in leading change. The fear was that computer use could be held hostage by the few teachers who had expert computer knowledge. Writing about the *seeding pair* in-service program Ingvarson and McKenzie [3] described in vivid detail the fears that some held about the role of the computer coordinator in schools:

Forebodings were expressed before our study began about the possibly negative role such people might play in the outcome of the courses, given that their background was usually a specialized one in Mathematics, Science, or Computer Science; and given that they were sometimes caricatured as introverted, anally retentive males with a strong sense of territory in relation to ‘their’ computers [3].

The *seeding pair* structure was intended to guard against the ‘gatekeepers’ by developing skills in those who attended the course. It was intended that the seeding

pair teachers would acquire skills, become involved in the development of school computer policy and work together to empower others.

3. Case Study of Vista College

The case study investigation of the impact of the *seeding pair* program at Vista College was undertaken in the second half of 1986.

3.1 Context

At the time of investigation Vista College was a Catholic boys' school in a south-eastern suburb close to Melbourne with an enrolment of approximately 770 students, a quarter of whom were from non-English speaking backgrounds. The school was not resource rich by any means and there were class sizes nearing 40 in many year levels.

Given the lack of resources, the decision to obtain the original computer system in 1981 showed great daring and foresight. The Headmaster of the time was known for pursuing modern approaches to curriculum provision. One notable example at about the same period in the school's history, was the building of an Arts and Technology wing – despite great opposition from some of the staff - to offer these subjects for the first time.

Along with the Headmaster's determination to provide a modern education at Vista College, his decision to purchase the Northstar computer was a reflection of the confidence he had in the Maths Coordinator and the friendship and trust he had developed with her husband who had left the academic world to get into the fledging computer business. He sourced the computer and wrote much of the software the school relied on in the early days of computer use.

The Headmaster had faced opposition from conservative staff members in building the Arts and Technology wing based on their objection that he was introducing 'Mickey Mouse' subjects into the curriculum. In contrast, there was little opposition to the introduction of a computer. The idea that computers were needed in schools had achieved rapid acceptance. In describing the developments at the College during the course of 1981 the Headmaster had this to say about the latest school developments:

Among these should be noted the setting up of a computer within the school. We are grateful for the advice of the Head of our Mathematics Department and her husband who have, this year, established this computer, which is better and more advanced than those usually found in Secondary Schools.

In 1982 a room next to the library was set aside to house the Northstar computer and a teacher was appointed to teach the Introduction to Data Processing (IDP) course as part of the Certificate of Business Studies course offered to Year 12 students as an alternative to the Higher School Certificate. The decision to offer the IDP subject rather than the newly accredited Computer Science course was a reflection of the view that it was becoming imperative to provide access to computers for a generation of students who would need computer skills when they entered the workforce. The

IDP subject was designed to be relevant to the general business student and this was seen to be more important than catering to the specialist computer studies student. To some extent this choice represented the nearest thing to a computer policy in the early years.

Other year levels were also given exposure to the computers. The large class sizes (35-40) meant that students went to the computer room in half class groups linked to the Mathematics classes. The Maths teacher remained behind to teach the rest of the class while the computer teacher taught the half class.

Because of the circumstances which led to the original purchase the computer area remained under the wing of the Mathematics Faculty. Rapid staff change led to instability in the computer area. There were six different teachers in the first five years of computer use and changes of Headmaster in both 1984 and 1987.

The Northstar computer did not prove very resilient and frequently broke down to the point that it was reserved for administrative purposes rather than student use. Students then used newly purchased Apple IIe computers. Up until late 1986 there were only 8 of these Apples which often meant that there were three students for each computer. In term 4 of 1986 an additional six Apple IIe computers were purchased with three added at the beginning of 1987. This allowed full classes to use the computers so long as there were two students for each machine.

In 1987 the curriculum included Computer Studies for Years 7-10 as well as the Data Processing subject. This meant that the room was timetabled with formal computer classes for 25 out of a possible 31 periods, thus greatly reducing the possibility of other subjects using the room. Year 12 Accounting and Year 11 Practical Maths classes managed to squeeze into the timetable.

3.2 The Decision to Send Teachers to the *Seeding Pair* Course

The decision to send two teachers to the Stage 1 *seeding pair* course in 1985 and another teacher to the Stage 2 course in 1986 was driven by the Curriculum Coordinator in conjunction with the Computer Coordinator. It was clear to the Curriculum Coordinator that more teachers in the school needed to know about computers, about what they could do and how they might impact on the students. The availability of funding was an important factor as Vista College did not routinely employ replacement teachers and the commitment to having two staff members at a week-long course was significant.

The two staff members who attended the Stage 1 course in 1985 were quite senior in the College. This was deliberate as it was thought that their seniority would mean that they would be more likely to be respected by their colleagues and less likely to be intimidated by negative members of staff. Susan, in her thirteenth year of teaching when she went on the course, taught English, History and Religious Education, had been English Coordinator and would later take up the role of Year 10 Coordinator. Patrick, having taught for 12 years, had a primary teaching background which enabled him to teach Religion, English, Social Studies and Mathematics. He was the Year 7 Coordinator.

The following year Steve, a first year Maths and Science teacher, attended the stage 2 course. While the Stage 2 course was supposed to be for senior staff or

computer coordinators, Steve was proficient with computers and would be the main teacher of computer subjects the next year. In a reflection of how these kinds of extended release courses were regarded at Vista College the second teacher who was to attend the Stage 2 course with Steve was not allowed to go as no suitable emergency teacher could be found to replace him.

The views of the participants about the courses varied widely. While Patrick and Steve were enthusiastic about what they had learned, Susan felt that the course did not meet her needs. In summary, her complaints were that there was too much 'preaching' about what constituted good computer use in a school, the course was not really for the uninitiated and that the course did not really help her to understand how computers could be used in her teaching. Susan expressed a lack of confidence in what she had learned and this had an impact on the extent to which she felt she could help others subsequently. Susan felt that she lacked sufficient skills to make effective use of a computer and, like Patrick and Steve, was disappointed that there was no follow-up from the original course.

3.3 Acting as Change Agents: Professional Development of Staff

The teachers who attended the *seeding pair* in-service course were full of good intentions but very little happened in terms of staff development. While Susan felt that she lacked the necessary skills to assist other staff members, Patrick and Steve were more than willing to provide professional development. The initial plan was to have them deliver professional development on one of the staff curriculum days. There were problems with this proposal, though, as time was limited. There were, on average, six such days in a year and they were taken up with the usual administrative matters and meetings which were considered essential to the good running of the school. The other complication was that the College had to complete a mandated School Development Project which took up much of the available time and was seen to be more urgent as there were timelines to follow. After-school sessions for professional development were considered but dismissed as an option because there were a great many extra-curricular activities which took place.

The lack of formal opportunities to deliver professional development meant that the seeding pair teachers had to resort to informal opportunities such as talking to colleagues, leaving work lying about and offering help. Steve even offered to put the timetable for the following year into a spreadsheet so that it could be saved and printed and could be edited at a later date if necessary.

The *seeding pair* teachers, the Curriculum Coordinator and the Headmaster were all conscious of the resistance of many staff members to the use of computers. Some staff members could not see the relevance of computers to their teaching and there were many complaints at the time that there was a lack of suitable software for educational purposes. This perspective then became entwined with the belief that trying to come to grips with computer use was likely to be time consuming. The lack of access to the computer room was seen to be a real disadvantage. Before 1987, bringing a whole class to the computer room meant having four students sharing a terminal. At this time there was simply no possibility that a teacher might have a computer on their desk at school or at home as part of their day to day work practice.

All of the participants of the study believed that there was an urgent need for further professional development as this was seen to be the key to improvements in the use of computers in schools. Despite this strong belief, there was no plan of action. It was almost as if the act of sending teachers to the course was enough in itself. There were no support structures in place to facilitate the work of the *seeding pair* teachers or were any seen as necessary.

3.4 Acting as Change Agents: Policy Development

Emily, the new Computer Coordinator in 1986, believed that she could easily develop the computers in education policy for Vista College but such a document would not be inclusive of the views of others and would, therefore, have limited usefulness in the College. The then Headmaster had a sense of the need for direction in the areas of computer literacy, understanding the impact of computers on society and determining a direction in computer education for the future. Nevertheless, despite agreement that a policy was desirable, six years after the introduction of computers in the school, no policy had been developed.

The *seeding pair* teachers all expressed a willingness to be involved in policy development as they believed the course had given them insight and skills in the area and that they could not have made a worthwhile contribution to policy development with their experience at the course.

As with professional development, there was no structure in place which would have facilitated the development of policy. Certainly there were competing priorities for attention and resources but, perhaps, the lack of support by the Headmaster was the crucial factor. The Headmaster had not actually used a computer and, while he might have been supportive of the establishment of general directions, he had neither the expertise nor the sense of urgency to develop policy in this area and, by the end of 1986, he had moved on to another position.

Towards the end of 1987 the Year Coordinators discussed whether the College was making the best use of the computers in the lab at one of their weekly meetings. Some believed that, while students needed exposure to the fundamentals of computer use at some stage, there should be less formal teaching of computers and more access to the computers for other subjects.

The opposing view was that the computers were too expensive a resource to run the risk of not being used except when someone decided to make use of them. Moreover, it was argued, access to computers was a matter of fairness. What if a Maths teacher in Year 10 wanted to use the computers while another did not; would it not be unfair to the students who missed out? It was this view which prevailed which meant that computer subjects remained in place and dominated the timetabled space in the computer laboratory. Without being able to access the computers there was little incentive to encourage teachers to try to make use of computers in their teaching.

To make matters worse, there were no computers available for staff use. Even the Timetabler had to use a computer in the back of the computer room to do his work.

3.5 Summary

Without regular access to a computer to further develop their skills and without structures in place to enable them to carry out their role, the *seeding pair* teachers were ineffective as change agents. There was an urgent need for on-going professional development but, again, without a structure to facilitate this there was no progress made with improving the skills of the *seeding pair* teachers or the teachers in general.

4. St Christopher's Grammar School

4.1 Context

At the time of the study St. Christopher's Grammar school was a co-educational grammar school with an enrolment of over 1000 students from primary school through to Year 12. By comparison with Vista College, St. Christopher's was a resource rich and competitive school in the independent school tradition.

In keeping with the beginnings of computer provision in Victorian schools, St. Christopher's began by setting up a separate computer laboratory and teaching classes in computer awareness to middle schools students. By 1986 there had been a move away from what was described as computers as topics and towards using computers within other areas. The computer awareness course at Year 10 continued as a more or less permanent feature of the curriculum. There was a well-resourced computer laboratory of Apple IIe computers in the secondary schools with more to come (as we shall see).

The Computer Department began, as was typical of the era, as part of the Mathematics Department and the Head of Computers was also the Sub-Head of Mathematics. The Computer Awareness course at Year 10 was delivered to students via their Maths class groups. The issue which arose from this organisational arrangement was the extent to which other staff felt that the computers in some sense, belonged to the Mathematics Department. Balanced against this was the obvious encouragement which the Head of Computers, Frank, gave to anyone wanting to use the computer facilities.

4.2 The Decision to Send Teachers on the Course

Frank, with the support of the Headmaster, chose the first of St. Christopher's Seeding Pair teachers to attend a Stage 1 course in 1984. This was understood to be a major commitment as the school was always reluctant to send teachers away on in-services at all, let alone ones which ran for an extended period. Despite his enthusiasm for sending teachers to the course, Frank admitted that he did not immediately grasp the importance or the potential benefits of the in-service. The two teachers were chosen with a view that the course would help them to introduce and

use computers in their teaching rather than how their attendance might benefit the whole school.

In fact the two teachers did not have a significant impact on computer use at St. Christopher's. Sylvia, a middle school English and History teacher had to go to hospital during the course and was off work for some weeks afterward. The other teacher chosen to go left the school at the end of the year.

Despite these setbacks, a second pair was sent to another Stage 1 course in 1985. Thomas, the Senior Master and Head of English and Jane, the Head of Geography, had significant positions in the school and it was felt that they would be better able to influence policy and help set directions for the future, especially in terms of computer use in their subject areas. Frank and a colleague applied to attend a Stage 2 course in 1986 but they were not selected because four teachers from the school had already attended a Stage 1 course.

There were divergent views about the appropriateness of the course strategies from the three participants. Sylvia was complimentary about the course and felt that it was pitched at the right level for her but it is worth remembering that she did not complete it due to ill health. Perhaps not surprisingly she made less use of computers after the course than either of the other two participants did. Her particular contribution was running a lunch time girls only computer group. Her experience on the course had led her to set up the girls' only group as she had formed the view that it was necessary to ensure that girls had exposure to computers.

Jane was positive about the course despite feeling that there should have been more hands-on activities. While she made great use of computers in teaching Geography, Jane felt that computers were another teaching tool and that they should not be seen as the answer.

Thomas felt that the conveners of the course spent too much time trying to push particular policy perspectives rather than providing the kinds of hands-on experience that he believed he needed. He had written to the organisers to express his views and vowed that computer in-services at St. Christopher's would be very much a hands-on experience.

4.3 Acting as Change Agents: Professional Development of Staff

The *seeding pair* teachers at St. Christopher's felt that they had little impact on staff members directly, despite their best intentions. They saw a divide already emerging between those who were willing to embrace the use of computers and those who were strongly resisting them. All three *seeding pair* Teachers could point to teachers they felt were doing "wonderful things" with computers in their classrooms.

St. Christopher's routinely set aside one of its staff development days to meeting staff requests for professional development and there was a sense of pride on the part of the *seeding pair* teachers that the staff voted to devote their curriculum day to the use of computers. Frank was pleased that ten teachers, including the *seeding pair* teachers, had volunteered to help put the day together. It was felt that much staff resistance would be broken down when the resisters could see what their colleagues were accomplishing.

The contrast with Vista College was obvious. Whereas any thought of offering professional development at Vista College had been somehow lost or simply never become a priority, there was clear action at St. Christopher's. Devoting a day to learning about computers sent the message that learning about them was important. While one day was of only limited value in the long run it did represent a base on which to build.

4.4 Acting as Change Agents: Policy and Strategic Development

The St. Christopher's Headmaster established a Computer Policy Review Committee in February, 1986. While he set the terms of reference the Headmaster chose not to be on the Committee. Because of their involvement in the course the Seeding Pair Teachers were invited to join the Committee. Jane was the only woman on the Committee.

The brief provided to the Committee was extensive, covering all aspects of computer use in the school. It met once a fortnight for three months and the methods of investigation included a questionnaire and school visits. In addition to the needs of administration, the library, the finance department and careers, the Committee considered a number of areas of concern including access to computers, the future of a computer subject, computer literacy and professional development for staff.

Access to computers was considered to be the most important question in 1986. As well as the Year 10 Computer Awareness course taking up space on the timetable, the demand for spaces by other teachers for the senior school computer laboratory exceeded the availability. The Committee considered deploying computers to classrooms but rejected it because the demand did not justify the cost. It was understood that, in general, teachers at the school preferred that students all work on the same task together and so the preference was that additional laboratory space which would serve this purpose. Only Jane objected to this recommendation, arguing that other ways of working might be better.

Instead of deploying computers in other spaces, the recommendation of the Committee was to provide for another laboratory. This second laboratory would have IBM compatible computers in a deliberate move to provide for business level machines. The direction was set that computers would provide an important point of contact with the business world. This meant that computers were being seen as, in the parlance of the day, topics rather than tools.

The computer curriculum was also considered. Computer Awareness at Year 10 was seen to be an important subject but the Committee also came to the conclusion that it was important to build computer literacy into the curriculum. The Committee believed that Computer Awareness could be phased out as other subjects moved to increase their use of computers. The plan for Years 7-10 was for the following:

- Mathematics to undertake programming
- English to cover word processing
- Geography to deal with the social implications of computing

It was thought that Computer Awareness should continue as an option for those who wanted to study computers and that Computer Science should be introduced for Years 11 and 12 for those who wanted to pursue a serious study of computers.

The original brief from the Headmaster did not provide for a consideration of the need for professional development of staff members. This was added by the Committee who surveyed all staff:

- 75% of staff members wanted to learn how to use computers in their teaching
- There was a strong demand for 5 week courses
- There was strong demand for 1:1 tuition by teachers
- There was strong demand for an external ISE course on computers
- Instructional posters were needed in laboratories
- Strong demand for access to a laboratory
- The feasibility of selling old computers to staff members should be investigated

The Committee identified a clear need for access to computers and for targeted professional development.

Most of the recommendations of the Committee were adopted, with the creation of the second laboratory seen as being crucially. Professional development was provided which helped break down resistance to the use of computers. Frank was delighted to discover that there were fewer hard core resisters than he feared but some remained and would not prove easy to shift.

4.5 Summary

In the area of policy the contrast with Vista College was striking. At St. Christopher's the formation of the Committee was a vital step in establishing a direction for the use of computers in the school. Including the *seeding pair* teachers ensured that their professional development was not wasted and that decisions about computers were being made by a group which included members of staff who were up to date with the latest thinking. Because the Committee was representative it sought to include the views and needs of other members of staff in a systematic way that tried to take account of their learning needs.

5. The Changing Times

The problems associated with facilitating change in schools are no less pressing today than they were in the mid-1980s. In fact the *seeding pair* in-service was quite sophisticated in the way that it made use of the research of the times to design an approach to change that was different to a centralised, top-down model. It is sobering to look back over thirty years to realise that there have not been any real advances in the way that professional development is used to create change in schools. Moreover, much of the recent emphasis on professional development for registration purposes has produced providers who have designed programs to cater for the individual teacher with little thought or interest in how the whole school might benefit.

One of the glaringly obvious issues to emerge from the case studies was the very different ways that the schools made provision for change. Vista College floundered

about without direction and the expertise of the *seeding pair* teachers was never put to good use either in policy terms or to provide professional development. St. Christopher's, on the other hand, provided a structure through which the seeding pair teachers could make a real contribution, especially in terms of providing a direction for the school to take in the short to medium term.

The role of the principal in creating that strategic direction remains important. In terms of technology strategy this is problematic. As a number of writers have pointed out the principal does not always have expertise in technology and yet is often the one who insists on a particular direction [12, 13]. One principal I know declared that he and the computer coordinator determined computer strategy over a cup of tea before school on a Friday morning. The question of who makes the decisions remains a vital one [12]. In the case of Vista College, the change in headmasters in 1984 and again in 1987 resulted in a computer policy vacuum. The emphasis became one of providing resources rather than providing direction for teaching and learning. The contrast with St. Christopher's could not have been more striking. There the Headmaster set a policy committee in place and they were able to add professional development to their brief. The result certainly provided the school with a sense of direction and a plan of action for the future.

Along with leadership, perhaps the major question of the 1980s was access to computers. At the time the thinking was very much concentrated on providing access to students and this was reflected strongly in the expansion of the numbers of computers at Vista College and the provision of a second computer laboratory at St. Christopher's. At Vista College little thought was given to providing access to teachers while at St. Christopher's computers were stationed in staff rooms. Providing notebook computers to teachers was some way off yet. Thanks to government policy [14] the problem of access to computers is no longer the pressing issue it once was. The Digital Education Revolution might well prove to be the beginning of a new chapter in the history of computers in education.

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