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Adaptation and Avoidance: Observations of Teachers' Reactions to Technology in the Classroom

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Abstract

Adaptation and Avoidance: Observations of Teachers' Reactions to Technology in the Classroom

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This paper reports and reflects upon the observed behaviours of teachers during the conduct of a large-scale telecommunications project. While teacher behaviours were not the focus of the project, they quickly became an exogenous force on the environment which could not be ignored. This paper is drawn from field notes which revealed a pattern of success and frustration, of adaptation and avoidance as those concerned dealt with the subjective and logistical changes in their lives and in their teaching practice. The story told here is about the complexity of change, and the struggles faced by individuals in coming to terms personally and professionally with externally-imposed change.

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Adaptation and Avoidance: Observations of Teachers' Reactions to Technology in the Classroom

In every state in Australia, as elsewhere in the world, teachers are being impelled to become computer literate and to demonstrate their ability and willingness to use computers in their classrooms. Power-coercive strategies are being brought into play by employer groups which include the threatened withdrawal of teacher registration and consequently of employment. Beginning teachers will not be employed unless certain competencies can be demonstrated (DEET, 1996, pp. 9-13). The ramifications have not been fully articulated in each state, but it seems likely that the 'stick' rather than the 'carrot' will be proffered.

The new mood is unequivocal. Those who refuse to become familiar with computers and computer-mediated technologies are to be targeted. Politicians would argue that the dollar investment is now so great that computers in schools must be used effectively to justify their ongoing expense, "a return for our education dollar" (Quinn, 1997, p.1). The pedagogical demand for new collaborative, more relevant models of teaching is growing. The sociological demand for contemporary relevance and preparation for the future is constant. Education needs to be relevant to its society. The need to stop providing so-called Industrial Age education for Information Age students is clear. An environment is being forged which suits the 'adapted' teacher but will create heightened problems for those who continue to 'avoid' technology in the classroom.

But how will individual teachers meet externally-imposed requirements, how will they respond to the conflicting discourses of their work. Day and Roberts-Holmes (1998) documented the 'stories of change' told by a group of teachers in the United Kingdom as they came to terms with the National Curriculum and externally-imposed changes to school management and organisation. The authors reported on the adaptations teachers made "to accommodate the conflicting discourses within which they find themselves" (p. 30). They suggested that it is imperative that "those who are to survive successfully [must] engage in an increased rate of personal adaptation and professional development - the steep learning curve or accelerated uncomfortable learning often associated with change" (pp. 28-29). This paper speaks to such personal adaptation and its counter emotive behaviour, avoidance. It looks to the "head and heart, the personal and professional" which Day and Roberts-Holmes suggested is integral to teacher change.

Methods

Recently, we worked in a telecommunications project with eighteen teaching professionals (8 teachers, 3 librarians, 3 computer co-ordinators, 4 school administrators) employed in four metropolitan schools. The schools were approached by the researchers who were seeking alternative ways of working with teachers in order to provide opportunities for them to use computer based tasks in their classrooms. At the time, professional development with technology was characterised by a deficit model - isolated or random in-service courses which often had the effect of making some teachers realise how much they did not know rather than instil confidence and competence in them to use technology in their classrooms. The project was based on the notion that by going into classrooms and working with teachers and children on

specific projects, they might see the value of using computers in the classroom and that via telecommunications they would share success stories with each other and other primary teachers.

The personal impact of the project on the *teachers* was not the stated focus of the project, but became such a tangible force and affective variable in the conduct of the project, that it could not be ignored. This paper aims to record their respondent behaviours and to categorise them in terms of basic psychological reactions. Naturalistic observations and diary entries of conversations give a snapshot of where these teachers currently 'stand' in terms of their use and affective attitudes towards technology. The observed individuals had a "comfort zone" which the incursion of the project did a great deal to unsettle. Their behaviours generally belong to the culture of refusal described by Hodas (1997) in which:

... any practice (and a technology is, after all, a set of practices glued together by values) that threatens to disrupt this existing structure [here meaning the school or the classroom] will meet tremendous resistance at both adoption and implementation stages.

In a classroom, it is quite possible to let the world pass you by. Teachers are not complicit in this - their day is subsumed by the numbers of students (including those now mainstreamed through inclusive schooling practices), a crowded curriculum (made fuller by the role of the school as a social band-aid fixing road safety, public littering, sexual harassment, human relationships, drug and alcohol education) and the politico-sociological pressure to go 'back to basics' (fuelled by almost constant media barrages on the fall of literacy and numeracy standards). Letting the world go by is a survival strategy - a mechanism to deal with daily pressures.

Teachers, in practice and by definition, work in insular environments. They have prescribed responsibilities confined in one geographical space, usually a room. Professional dialogue in a school becomes restricted to minutiae - daily routines, logistical issues.

This scenario and its concomitant effects are described by Riel (1993, p. 222) who wrote that:

Teachers are currently isolated from their peers and from learning opportunities because they spend most of their time working alone in classrooms. The isolation of the teacher becomes reflected in a view of learning as a process which takes place in the minds of students working quietly at their desks.

The teachers in this study all operated within this isolation zone. They were all "good" teachers, experienced and capable. The technology - in the form of telecommunications - stood to shatter the operations of their classrooms, and more significantly, their sense of self-esteem and self-actualisation as effective classroom teachers. As computer users, they ranged in ability with most not using technology at all until government initiatives had placed two or three computers in their classroom.

The Primary Computer Program (PCP) was begun in 1993 and was itself an extension of a 1992 project entitled Computers in the Schools (CISP). The Primary Computer Program aimed to provide all Year 6 and 7 (by 1997) Queensland students with access to computers to enhance their learning. The Primary Computer Program had two main aspects. These were (i) **learning technology** - with computers and peripherals being purchased for classes, and (ii) **professional development** - to support in-service activities for teachers implementing the program.

The philosophy behind the initiative was related to the desire that:

... [children] can best understand the role and value of technology in their own learning through experience of it in a varied curriculum context. ... the program will emphasise information technology as a personal learning tool requiring new skills, offering new horizons of information and knowledge, and offering the power to greatly enhance personal productivity.

(Division of Communication and Information Systems, 1990, p.4)

During 1993, approximately \$4.2 million was spent on the initial round of hardware and software purchases. The funding was allocated on a competitive basis to schools who submitted an application to their Regional Office. The total amount allocated over the four year period was \$18.2 million.

None of the teachers who worked with us had independently initiated computer-mediated projects. The schools had acquired the computers through the PCP and were now expected to use them effectively. Our intervention seemed timely in terms of providing them with an opportunity to use the computers that had been placed in their classrooms in ways which were more closely related to the 'new horizons' and 'power' alluded to rather than casting the computer into the role of \$2000 typewriter. We were critically aware, however, that their participation was not something which they had initiated themselves but which they had agreed to in order to find out more about how the technology might be used within their own practice and within the context of their own classrooms. They were aware of the need to 'adapt' to new classrooms which regarded computers and computer-mediated technologies as components as fundamental as blackboards and desks.

Teacher Reactions

As human beings we deal with a state of anxiety by either (i) direct-coping here called 'adaptation', or (ii) by defensive-coping here called 'avoidance'. We respond to the latter by adopting psychological defence mechanisms such as intellectualisation, rationalisation, denial and projection.

Adaptation

The teachers who *adapted* to the telecommunications project were those who firstly separated the task from its context. That is, they re-contextualised their role as one of management. They were executive, organising rosters and schedules for student activities. For example, in the telecommunications project, they kept meticulous checklists of who had sent and received messages. They demanded hand-written drafts of planned emails from students which could not be sent until they had been proof-read. They re-asserted themselves as classroom teacher through this executive function.

Three of the teachers, however, moved from this role to a more critical one where the telecommunications itself gained a purpose as a technology in its own right. They started (and have continued) to use Email in their daily communications with each other and with the Project Officer replacing earlier communication by phone or fax. Using the medium was critical to its acceptance and served as a useful model to their peers.

Only one of these three has gone on to be a truly committed teacher 'with' technology. She has initiated a reiteration of the university project with another school undertaking sole management and responsibility. Her classroom has, through personal contacts, established regular Email contact with an Australian scientist in Antarctica. Her use of telecommunications in the classroom is now an integral part of her teaching methodology and she is staunch in its defence as a pedagogical and motivational tool for children. She has begun to see the writing of an Email message as representing a new language genre for children. It is to become part of her repertoire of language arts to be developed and assessed.

This teacher has overcome a lack of technical expertise and hands-on experience through determination and perseverance. Her sense of personal achievement was tangible as evidenced in the first Email she sent to the Project Officer, in which she wrote:

I've found the back-door to the computer ... I am genuinely impressed. Technophobes of the world unite! I was pleased that I was sitting at the machine when the message arrived.

Adapting individuals identify problems and pose sensible solutions to overcome them. This teacher (and one of the librarians) attended computer workshops and conferences to expand their understandings and experiences. They began to know 'what they did not know'. We are all aware of the rapid technological changes around us, but as Richards (1996, p. 8) suggested we often "feel relatively powerless to prevent such change and insufficiently informed to articulate such fears". It is a marked sign of adaptation that questions can be formulated and that some personal empowerment does take place.

Avoidance

The traditional manifestations of psychological avoidance were noted in teachers' comments and actions throughout the project and are here illustrated by verbatim statements and observed actions.

In the first instance it was evident that some teachers refused or were reluctant to become computer literate at all. This process of *intellectualisation* concerned the problem of technology itself. One teacher proffered reasons that centred around "the mystique of computers". He argued that "high technology is so difficult", most people [here meaning teachers] demurred to a "high priest who mediates the knowledge to the pilgrims". Another spoke of "maze confusion", elaborating that "there is so much to comprehend, too much to know, too many questions to have answers". These individuals then refused to take ownership or personal control, waiting for an un-named other to take leadership, to 'teach' them what to do.

Secondly, teachers *rationalised* their lack of use of computers (and that of their colleagues) by stating that there were barriers for its effective use. The most oft-cited barriers were (a) time, (b) duty of care, (c) gender and (d) age.

a. Time

There are no spare minutes in my class; they're already taken up with maths, remedial reading, just keeping up!

Teachers are so busy - we have a de facto system of trade offs which hides how specialised and how busy teachers are becoming. No one person can know everything. No one person can do everything.

b. Duty of care

I don't like it when they're out of my supervision. They could be down the library doing almost anything - even if I was there, I wouldn't know what they were doing. I'm responsible for them, aren't I?

c. Gender

... at the start of the year, we have to nominate the two committees we will be on. Now - and I'm not being sexist here - the women always choose to be on the 'language' committees. We always end up having to draft women onto the technology committees because you can't just have men there.

d. Age

... then there are those who are close to retiring, who are going to coast it in, who needs the hassle of learning all this stuff, and who would blame them.

Denial mechanisms were observed in some teachers' refusal to take ownership during the various phases of the telecommunications project. The Project Officer was frequently asked "Is that all right?" when teachers wanted to know about such matters as the use of the modem, the extent of independent research or student membership of existing telecommunications projects.

Denial seemed also to be a factor in the reaction of two of the computer co-ordinators when offered sponsored places at a conference dealing with telecommunications in education. Both independently responded as if insulted that the offer had been made. They indicated that they considered themselves to already be 'expert' in their use of computers in the classroom and in no need of additional information or advice. What was interesting, as observers, was that neither of these co-ordinators shared information with their teaching colleagues and seemed to retain their ascendancy through the with-holding of information. At one of these schools, the co-ordinator's absence at a school camp meant the complete halt to the project. No-one else knew about it! Power games were being played and were largely the product of personal insecurities and a desire to conceal a lack of knowledge through smokescreens of mystique. That these co-ordinators were male in predominantly female teaching staffs may have been a contributing factor to the defensiveness of their behaviours.

Reluctance or refusal to become involved was *projected* to the children as a deficit in their behaviour or attitude. The teachers said:

"the kids aren't keen" [to use the computer in their own time]

"but they're always as keen as mustard to use it in class time" [as an indication of their work-shy habits].

"with the type of child in my class" [meaning they couldn't be trusted]

"he is a particular type of child" [referring to one boy who was banned from computer use because of a breach of Netiquette].

This projection shifted the responsibility from the teacher to the student. It is the students who are culpable in their not using technology in the classroom. That the teachers themselves did not themselves note the logical flaws in these assertions is evidence of how genuinely held are such rationalised beliefs. The speakers probably knew them not to be true, but simultaneously believed them.

High levels of frustration were observed as participant teachers came to terms with the incursion of technology into their classroom. *Defensive-coping* reactions to frustration are most commonly direct or displaced acts of aggression. Displaced aggression is referred to as *scapegoating* and was the most common manifestation of individual hostility observed in this project. It is itself related to the processes of projection previously discussed.

One teacher volubly announced, in front of both her students and the Project Officer, "What is the problem with the machines in this school? They never work properly!". What she was signalling here was that the reason she didn't use the technology was therefore the technology's fault. The telecommunications connection had failed to work because her teaching partner had deleted the Netscape files to make 'room' on the machine's hard drive. The public nature of the announcement was a way of assuaging her feeling of guilt, of explaining to her students and to her peers her reasons for not becoming involved with the project and for not using technology. She was transferring the blame to the inanimate machine, even though the problem was patently one of human intervention. The machine as scapegoat was an effective displacement of her hostility and frustration.

In another school, there seemed to be a strategic battle for location of the modem. The librarian wanted the phone line and appropriate hardware moved to the library from the Year 7 classroom. Her argument was based on the principles of equity, suggesting that whole-school access was a major issue of Internet use in the school. In relaying her arguments, she indignantly stated "And they say **I'm** power-building!". Of interest is that in another of the schools, the librarian was actively campaigning to have the Internet-capable computer removed from the library. She contended that there would be an untenable disruption to her working space, saying that "they'll [the students] be coming in and out, needing help, disturbing others". Neither librarian had their wish granted, and subsequently both remained resentful of the circumstance in their schools.

Perhaps the only examples of direct aggression was where the computer co-ordinators refused to attend the sponsored conference and where two teachers in one school physically 'hid' from the Project Officer who had arranged to provide some one-on-one training for them during a pupil-free day. There was some difficulty in locating them, and when found, they made ineffectual excuses as "We came back from lunch and you weren't here" and "we even checked with the Principal". They had taken advantage of a ten minute delay in travelling time to go to ground. The planned session went ahead but was marred by teacher resistance and negativity.

There was only one teacher who evidenced a genuinely *neurotic reaction* to technology in the classroom. She retained strong technophobic reactions to the project. Her avoidance mechanism was physical and she had to be cajoled into actually using the computer. She was visibly nervous, pale and anxious during the experience. She held the mouse tightly and made such

violent movements with it as to frequently lose the cursor. She made repeated reference, with her voice notably at a higher pitch and rate than usual, to how she refused to "even touch the VCR at home" demurring to her husband's expertise. She was an adult, a teaching professional, displaying the regressive behaviour of primitivation.

This was an disconcerting incident and one which placed an excellent classroom teacher into the role of an incompetent or insecure child. Yet, paradoxically, this teacher, as with the 'adaptors', had developed appropriate and exceptionally effective classroom strategies. She used peer tutors and a system of distributing received mail to students through printouts. Her own fear caused her to shift from a teacher-centred to a more socio-cultural model of teaching and learning. The student tutors were unaware of their teacher's fear and actively enjoyed the responsibilities they were given. The new imperatives to be computer literate will undoubtedly hasten this teacher's retirement and may even cause her to leave a lifetime's work focusing more on the negative aspects of her teaching than on the positive.

What becomes essential to engender is an environment of care rather than one of censure. We must acknowledge that this new environment will involve:

... change in the notions of knowledge and information, change in pedagogy, change in the role of the teacher, and change in the way technology is used in the classroom. To achieve this requires professional development that attacks the very psyche of individual teachers and promotes an attitudinal shift that inspires radical and dramatic change in the classroom. This needs to occur in a way that does not marginalise any group. There are teachers in the system who are opposed to change and dismiss technological innovations as yet another fad that will pass. This group clings to the past and values traditional ideals. These values are not insignificant. It is crucial to muster the support of the 'traditionalists' and win them over so that their wisdom and expertise are not wasted or lost.

(Bates, 1998, p.6)

Teacher Reaction to Student Behaviours

It is perhaps important to note here that the avoidance behaviours noted in teachers was not evidenced by the students. The Director-General of Education (Queensland), Frank Peach has suggested that "today's students operate in a different paradigm to their teachers" (1997, p.iii). The observations in this project would confirm this as the participant students quickly became familiar with the processes and requirements of the telecommunications project. Students in all schools approached the Project Officer with the email addresses of parents or older siblings (at work or university) and ask to send messages. They were permitted to do this and would conduct simple everyday conversations with them. It was the first time they had used email but it was as casual as if they were making a phone call or having a direct conversation. One girl asked her mother what was for dinner. She was still at the machine when the response came. It was as if she had simply extended her family into the classroom, and the classroom had expanded into other parts of her world. The lack of fanfare was the most telling aspect of this interchange and stood in stark contrast to many teacher behaviours.

Students thus seemed to enjoy communicating with others and adapted effortlessly to the medium. One teacher became 'converted' through her observations and now describes computers as 'communication, not information devices'. She was particularly impressed with the effect on

those she had dubbed her 'slower' students who were motivated to write when the task was to communicate with another student. She has been given new purpose to her adoption of computers in the classroom.

Students in three of the schools took on the responsibility for the downloading of mail and distribution of messages, in either written or verbal form. They remained enthusiastic and reliable throughout the conduct of the project. In two of these schools, this continued involvement was despite teacher negativity and abnegation of responsibility. One such teacher admitted to her Principal that she was unhappy that the children knew what to do and she did not. She had attended all the instructional sessions with her students and had been given the same demonstrations. Her profound belief of teaching and learning therefore was that the teacher *must* know more than the child, that her classroom was predicated on a transmission model (Renshaw, 1995) in which she, as teacher, was the source of the child's knowledge. Her profound belief of technology was operational predicated on notions of a process to produce a product. Alternately she was evidencing expressed by Hodas that the threat of technology "cuts deeper, to the heart of teachers' identity and self-respect".

One teacher who intended to assess the children's workbooks (provided as part of the main project) was also displaying this operational or functional approach to both their teaching practice and the technology itself. Hodas (1997) speaks of the normative and conservative functions of schooling, and here teachers are seen to be attempting to impose one paradigm of instruction over another.

One of the main problems for those schools where teachers continued to display 'avoidance behaviours' was related to the supervision of students while they were engaged in telecommunications. The computer with the modem connection was often out of the classroom area. It was either in an area adjacent to the classroom, located in a computer lab next to the Year 7 classroom or remotely located in the school library.

There were continued but minor incidents of inappropriate messages being sent from unsupervised environments. However, in one instance, an unsupervised student used the connection to make a booking at a five-star international resort with access to the heli-pad. He entered his parents' Mastercard details in his dispatch. The school abruptly went 'off-line' as the Principal had confiscated the modem. 'Avoiding' teachers saw such behaviour as confirmation of their stance. The incident strengthened their position and reasserted their control over the students. 'Adapted' teachers responded very differently. In one school, they quickly and collaboratively developed an overdue policy of supervision, access and parental permission which led to a resumption of their participation. This action gave them a sense of autonomy and heightened their participation in the project. The incident could have been the blind to close the project; but it was a spur to heightened involvement. It is a curious outcome that the such incidents could strengthen the beliefs of both 'adapters' and 'avoiders'.

What all teachers and others observed in this project failed to note was that student behaviours are often a direct reaction to the dynamic created by the teacher. That students here responded well or badly, despite teacher beliefs, is of interest and is perhaps a measure of the role of information technology in their lives. Students do not fear technology. The observations here are that they are generally competent in its use and are capable of using it irrespective of what their teachers do or believe. It leads us to the assumption that teachers who hold the transmission view of teaching will not 'adapt' to technology in classrooms because of the power it gives

directly to students. It is not a fear of technology, it is a fear of losing who and what you understand a teacher to be. Hodas (1997) spoke of the "insular culture of self-congratulation that attempts to reassure them [teachers] that they are competent and selfless professionals, that their social and institutional function is to develop the very best qualities in the children they serve".

Vulnerability of teachers

The purpose of this paper is not to diminish those teachers who displayed 'avoidance' behaviours. There seems little to be gained in berating teachers as "middle-aged technophobes" (Maslen, 1995, p.13) or to state that "the bulk of our teachers are either inadequately equipped, ill-trained, or clinging to outdated teaching practices" (Lynch, 1996, p.13). The lot of contemporary teachers is a sorry one. They have been held accountable for high levels of unemployment due to low levels of literacy and numeracy, for increasing violence in our homes and on our streets and for the national debt! Schools have increasingly become the band-aid for society and the media hype for a technologically-literate society has added one more item to this 'fix-it' agenda for schools. Day and Roberts-Holmes (1998) described the "conflicting discourses" of contemporary schools at a time of government intervention and the linking of school outcomes to national economic imperatives. The current political fixation with education equating to dollars for technology is part of the problem, rather than part of the solution.

The professional development of teachers has been an easy cost item to remove from the spreadsheet of educational spending. What professional development does occur takes place in teachers' own time, and is often opportunistic not needs driven. What teachers 'do' is based on what is offered or available, not necessarily what is needed, following a 'just in case' rather than a 'just in time' model. Undertaking more formal studies (towards university accreditation) is problematic for teachers not only in terms of time, but in the costs implicit in the Higher Education Contribution Scheme (HECS). There are some support schemes available but these have a very small audience and are highly competitive.

The scenario is that a target bull's-eye could be drawn and teachers could be placed at its direct centre. The arrows coming towards it may not make a direct hit, but they will certainly create feelings of uncertainty and trepidation. The preferred model of professional development is one which shifts the locus from 'me' to 'us'. Teachers will only cease to feel vulnerable when they no longer feel the insular responsibility for the adoption of technology into their classrooms. The aim is thus to take teachers off the target and hand them the bows and arrows; to put them in a position of control, rather than one of vulnerability.

Teachers feel vulnerable because they are being threatened by political and sociological pressures beyond their control. They do not feel that their needs in respect of technology were not being met by existing in-service and professional development programs. What remains important to them is that their professionalism and personal esteem needs to be respected, not devalued. What mitigates against them is that teaching is fundamentally an insular profession and they, as perceived 'experts' do not need help.

The experience of this project is those who 'adapted' were those who became active. An integral part of successful teacher professional development could be seen to be the creation of an environment of active engagement - of working with and through the technology to achieve a particular goal. Lave and Wenger (1991, p.93) stressed that a 'community of practice' can only be formed in circumstances where participants are active, as opposed to adopting 'peripheral' positions.

This involvement adds the affective dimension of engagement thus changing the individual's experience of the technology, and, in turn the 'stories' the individual imparts (implicitly or explicitly) to students about the technology.

The 'adapted' teachers were ones who were student-centred. Being trained in using the technology on an operational level was not the total answer to their application. They often used technologies which they themselves did not fully command. That operational level had very little to do with teaching; being a software trainer and a teacher are two very distinct roles. The 'best' or the adapted teachers here focussed on what they did well not on the functions or sub-menus they were uncertain of. Their teaching models were socio-cultural and they positioned the technology as subservient to the task it facilitated or the people it served.

The three teachers who began to use Email as a personal communication facility displayed a cultural shift in their use of technology. There is a growing sentiment in Queensland that 'connecting teachers' is more powerful than 'connecting schools' (Williams & Bigum, 1994). This is much more complex and subtler than connecting schools. So the political promises are often for cables and machines, the outward signs of technological progress. Providing support for staff development and other infrastructures are not so easily revealed. It is not just a matter of training. Technology must impact on a teacher's life before the introduction into the classroom can have any real credibility or conviction. This impact is not merely operational, it is attitudinal. The teachers in the school where the student abused his use of communications to make hotel reservations, displayed a cultural shift in their pro-active endeavours to salvage the project from their Principal's directive. In the short time of its operation, they had come to see it as important and ceased to see it as threatening. The teachers in Day and Roberts-Holmes's study were "able to find ways of reasserting their professionalism after a temporary period of shock, innovation, fatigue and, in some cases, disillusionment" (p. 30). The adapted teachers in this study evidenced similar behaviours, the setbacks were overcome.

The 'adapted' teacher looking at the technology as a means of expression, the creation and promotion of a new writing genre is displaying a more critical attitude. The technology has become critical to, but transparent in, the task at hand. It is the writing which is important. The communication with an audience other than the teacher is merely the motivational context for the task.

There is much to be learned from the research accompanying the ACOT Project (Apple Classrooms of Tomorrow). Dwyer (1994, p.6) relays one teacher's observation, who said:

As you work into using the computer in your classroom, you start questioning everything you have done in the past and wonder how you can adapt it to the computer. Then you start questioning the whole concept of what you originally did.

What this teacher is really saying is that technology in the classroom fundamentally challenges a person's psyche. It makes you question who you are and what you are doing. This is both profound and threatening. This understanding clarifies the reasons behind the 'avoidance' behaviours noted in this paper, and encourages us to not be dismissive of the conflicts faced by individual teachers. It is not techno-fear, it is disempowerment and a loss of the sense of self.

Conclusion

The key to the change from 'avoidance' to 'adaptation' in the use of technology in the classroom is dependent on a shift from operational to critical behaviours. It is not necessarily hierarchical or sequential, nor is it necessarily linked to technical expertise. That teachers must 'adapt' is essential to the new educational paradigms. 'Adapted' teachers will be the ones who do not fear technology. Postman (1996, p. 192) writes of how a new technology "makes war against an old technology". Here the 'old' technology is the didactic transmission-model classroom where the teacher was the centre. The 'new' technology is in fact, the new computer-mediated classroom where didactic methods do not belong. The 'adapted' teacher needs to not only come to terms with computers on an operational and management level, they need to re-consider deeper understandings of what a classroom is, and the 'new' teacher's role in it.

Day and Roberts-Holmes (1998) suggested that those who are promoting change should "respect those who are implementing it [the change] by listening to them, demonstrating an understanding that extra time and energy are needed" (p. 29). They should also recognise that "change is complex and involves the head and the heart the personal and the professional" (Day & Roberts-Holmes, 1998, p. 29). This project gave us a glimpse of this future and brought teacher vulnerability into sharp focus. It was an epiphany to the teachers whose lives it touched. It highlighted for the research team that practising teachers need both support and understanding to change, to re-invent themselves to forge a new classroom dynamic, and to better understand the paradigm shared by the children they teach.

References

Bates, J. (1998). New educational paradigms. Unpublished student paper, QUT, Brisbane.

Department of Education, Employment and Training (DEET) (1996). *Education and technology convergence: A survey of technological infrastructure in education and the professional development and support of educators and trainers in information and communication technologies*. Commissioned Report No. 43. Canberra: AGPS.

Day, C. & Roberts-Holmes, G. (1998, May). The best of times, the worst of times: Stories of change and professional development in England. *Change: Transformations in Education*, 1(1), 15-31.

Division of Communication and Information Systems (1990). *Further proposal for the learning technology program 1990-1991*. Brisbane: Queensland Department of Education.

Dwyer, D. (1994, April). Apple Classrooms of Tomorrow: What we've learned. *Educational Leadership*, 51(7), pp. 4-10.

Hodas, S. (1997). *Technology refusal and the organizational culture of schools*. URL: <http://homepage.seas.upenn.edu/~cpage/techref.htm> (Date visited: 20 November 1997).

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lynch, P. (1996, September). Schools face the future. *Australian Computer Living*, pp. 34-42.

- Maslen, G. (1995, August 8). Information Rich, Information Poor. *The Bulletin*, pp. 12 -15.
- Quinn, B. (1997, July 9). Ministerial statement on information technology (IT). Queensland State Government.
- Renshaw, P. (1995). Excellence in teaching and learning. In R. Lingard & F. Rizvi (Eds.), *External environmental scan* (pp. 27-33). Brisbane: Department of Education.
- Peach, F. (1997). Foreword. In State of Queensland, *Schooling 2001* (pp. ii-iii). Brisbane: Government Printer.
- Postman, N. (1996). *The end of education: Redefining the value of school*. New York: Vintage Books.
- Richards, A. (1996) . Education and the Internet. *Quick*, 62, pp. 8-12.
- Riel, M.(1993). Global education through learning circles. In L. M. Harasim, *Global networks: Computers and international communications* (pp. 221-235). Cambridge, MS: MIT.
- Williams, M. & Bigum, C. (1994) Connecting schools to global networks: Curriculum option or national imperative? *Australian Educational Computing*, 9 (2), 9-16.