DO YOU GET MY DRIFT? HELPING TEACHERS IMPROVE THEIR USE OF COMPUTERS IN TEACHING

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ABSTRACT

This paper draws on the results of an in-depth ethnographic case study into 'self-taught computer-using teachers'. The importance of 'personal' factors such as knowledge of computers, pedagogical content knowledge, practical theories of teaching, knowledge of routines, confidence and teaching experience are considered as a framework for understanding how computers are used (or not used) by teachers. The key features of an in-school professional development program being trialed and implemented during which specifically addresses teacher growth in these areas are outlined.

KEY WORDS

Teachers' knowledge, change, pedagogy, professional development, computers

INTRODUCTION

Key findings of a recent study (Chandler, 2001) concern the importance of teachers' knowledge and its development on how they integrated the use computers with their teaching. That study investigated the pedagogy of teachers who use computers but who have had not had any substantial training in the technical aspects of using computers, nor any specific training or education relating to the pedagogy of computer use - a phenomenon which as been broadly documented in Australia and elsewhere (Plomp & Pelgrum, 1992; Shears, 1995). I call such teachers self-taught computer-using teachers.

The purpose of this paper is to illustrate the importance of several forms of teachers' knowledge on the pedagogy\(^1\) of three self-taught computer-using teachers at Outeast College\(^2\). Indeed, it is argued that it is the less tangible dimensions of teaching and professional development which are

\[^1\] I understand pedagogy to mean “the function, work or art of a teacher; teaching” (The Macquarie Dictionary, 1991).

\[^2\] Pseudonyms are used throughout.
most likely to be the powerful mechanisms by which teachers can effectively adapt to using computers in their teaching - to know the teacher deeply and individually to ‘get with their drift’, so to speak. This discussion is followed by the presentation of the features of a professional development program (currently being developed) which has developed out of what has been learnt from the study of the three teachers.

THE STUDY AND METHOD


Following a general invitation to all the teachers at the school to participate in a study which would help both each teacher and myself achieve a better understanding of the pedagogy of computer use, Geoff, Howard and Arlene (introduced in more detail later) volunteered to participate. They chose a particular class with which they planned to use computers regularly, and I videorecorded their work with that class in the computer laboratory in the same timeslot each week for every week that it was feasible to do so for the whole of a school year. During the year, recordings were not made if the teacher concerned was absent from school, if I (as researcher) was absent from school (so the equipment could not be set up), or if the class was involved in some other activity (for example, a sports day). The video recordings represent a comprehensive record of the work of each teacher working with a particular class as a self-taught computer-using teacher for the whole of a school year.

In addition to video recording, I held individual interviews with Howard, Arlene and Geoff individually four times during the course of the year. Each interview lasted between 45 and 70 minutes. On three of these occasions, I used video replay was used to promote discussion and thereby to learn something of their views of particular classroom events. This usually took the form of the tape being played and either myself or the participant pausing the tape and discussing features which interested us.

Analysis of the videorecordings began by my writing a commentary on each class as I reviewed the videotapes. The degree of detail and scope of the commentary proceeded according to the recommendations of Erickson (1982) and Cohen and Manion (1989, p. 127). I read and re-read the interview transcripts and commentaries, trying out different categorisation methods and, as Lancy (1993, pp. 21-22) says, generally pushed and pulled text and ideas until they fell in into reasonable, broader topics and differentiated outlines. In this way, the categories were emergent from the data and not the result of applying a pre-defined theoretical framework.

Throughout his process, I kept an open mind about the importance of teachers’ knowledge on the pedagogy of Geoff, Howard and Arlene emerged, together with other possible influences, such as incentive structures, subject subcultures, professional support structures, number and distribution of computers, and technical capacity of computers. What emerged from the data was that, for these teachers in the particular circumstances of Outeast College, teachers’ knowledge was the dominant influence on pedagogy. It is the conceptions of teachers knowledge which I have come to understand as being important influences on each participant’s pedagogy which are now described.
TEACHER KNOWLEDGE

In studying Arlene, Geoff and Howard, I made three important and enduring assumptions about self-taught computer-using teachers. The first is to adopt the philosophical position that learning, for teachers, is constructivist in nature. The central tenant of constructivism is that we come to know our world by interacting with it (Brookes, 1987). As Knowles and Holt-Reynolds (1994) (quoted by Carter & Doyle, 1996, p. 122) have explained,

people construct ideas as they learn, and they use prior knowledge, experiences, and beliefs, as well as interpretations they generate in the moment, as the stuff out of which to build those ideas.  

To adopt a constructivist epistemology for teacher knowledge is to assert with Clark (1988, p. 7) that such knowledge is robust (insofar as it proves to be viable), idiosyncratic, sensitive to the particular holder, incomplete, familiar and sufficiently pragmatic to have taken the learner to where he or she is today. It is also to acknowledge that knowledge is not constrained to the learning of propositions and rules at identifiable moments in time, but includes the rather more ad-hoc accumulation of experiences, beliefs and interpretations.

The second assumption that I make is that teacher knowledge is more multi-dimensional than simply the content of a particular subject, and has been conceived of, and described in, various ways (e.g. Elbaz, 1983; Shulman, 1986). The third assumption is that there is a strong relationship between knowledge and pedagogy (Carter & Doyle, 1996). Early research on pedagogy stressed the importance of teacher behaviour, seeking, for instance, causal linkages between specific teaching practices and student outcomes (Isenberg, 1990, p. 322). Increasingly, the importance of teacher thinking on pedagogy has been studied. The development of the field has been in response to a growing realisation that teacher behaviour is substantially influenced and even determined by teachers’ thought processes (Clark & Peterson, 1986) and even that “classroom practice is a direct reflection of teachers’ thinking” (Wright, 1987, p. 109). Such views portray teachers as active, engaging and rational professionals (Isenberg, 1990) and as sense-making constructivists (Halkes, 1986).

I have found three conceptions of teachers’ knowledge to be helpful in understanding the pedagogy of the teachers at Outeast College. They are: the understanding of teachers’ knowledge to be developing in a constructivist and life-long manner; the notion of practical theories of teaching; and Shulman’s theory of teacher knowledge (Shulman, 1986), which identifies content knowledge and pedagogical content knowledge as key elements. These dimensions of the totality of teacher knowledge are discussed along with the finding specific to Arlene, Howard and Geoff later in this paper. I now provide a brief introduction to the participants and the setting in which they worked.

THE PARTICIPANTS AND THEIR SETTING

Outeast College is a private, co-educational school in the Eastern Suburbs of Melbourne providing education for students from Pre-Preparatory until the end of their secondary education. There is no sense in which Outeast College is thought to be representative of schools in terms of the computing resources available, their placement and distribution among the classrooms of the school or the response by staff to their use. These factors will vary greatly from school to school. In the same way, neither Arlene, Howard or Geoff thought to be representative of any particular group of teachers.

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Geoff

Geoff is a foundation staff member, starting at Outeast College 14 years earlier as a first-year-out teacher, and he has taught there continuously since that time. When I first met him some years earlier, he was a teacher of Physical Education, but at our first interview he explained that...

... when I first started I was a classroom teacher - grade 3 - and then after three years I taught in the secondary school - PE and Maths and in the junior school I taught PE and sport as well at the same time - that was about two years worth and then the last seven or eight years primarily PE and Sport in the Junior School ...

(Geoff, Interview 1)

Before teaching allotments for the year had been finalised, Geoff had expressed an interest in using computers in his teaching, and had volunteered to be part of the study. Consequently, he was delighted when his teaching load for the year included being a 'computing specialist' for the year three class. However, his work was distributed over a range of teaching programs, and even referred to himself as the "timetable fill-in guy". Geoff’s adaptability and innovativeness, however, are the factors which I believe enabled Geoff to manage the teaching of a diverse range of discipline areas and year levels, as discussed later in this paper.

Howard

Howard had taught at Outeast College for just over eight years, having completed his teacher education course approximately 18 years earlier. Howard’s teaching career, as he told me during our first interview, is marked by being an English teacher during an era when there have been infrequent vacancies for English teachers. His initial appointment at Outeast College was to teach English and SOSE (Studies of Society and the Environment), but more importantly to work with overseas students. The first full year that he taught at the school was also the first year in which the school offered places to 120 overseas students, and Howard was appointed to the role of International Student Co-ordinator (ISC).

Howard was ISC and a teacher of English as a Second Language (ESL) when I first met him, and it was as a teacher of Year Eleven ESL in which he participated in the study. In our first interview, Howard outlined his career trajectory. He had moved directly from school to university, and much of his teacher education experience had been in a school with a great many migrant students. During his university studies, Howard had a church-based position as a worker for human rights and justice. Following teacher education, Howard told me that he had spent about six months as an itinerant teacher taking any job he could find before taking a permanent position in Singapore. Howard’s interest in helping people make a new start in new situations are the factors which I believe enabled Howard to manage the teaching of a diverse range of discipline areas and year levels, as discussed later in this paper.

Arlene

Prior to the commencement of this study, I had known Arlene as a House Co-ordinator and teacher of English and History in the senior levels. Arlene participated in this study as a teacher of Year Seven English, the first time in several years that she had taught that subject. Arlene was a late entrant to the teaching profession, having commenced at Outeast College eight years earlier,
Arlene was by far the most skilful computer user of the three participants, but I did not find that this was reflected in her pedagogy. Rather, as elaborated later, I believe that each teachers pedagogy was more influenced by theme running through their life and their teacher, and in contrast to Howard or Geoff, I had found that it was difficult to discern themes in Arlene’s teaching.

LEARNING FROM GEOFF, HOWARD AND ARLENE

Having described the study approach, the setting and having introduced the participants, I will now move to a my major brief in this paper - that is, to describe what I have learnt in my initial working through the aggregated data on Howard, Geoff and Arlene and their teaching with computers.

General Findings

After observing them over the course of a year, I believe that the following are true for Howard, Arlene and Geoff:

- They were willing and committed to the use of computers with a particular class at least once per week for a whole year.
- They were well placed to be innovators, from the point of view of career development and organisational and personal factors which may impinge on them.
- They presented as being generally self-efficacious in their teaching.
- They were confident in established methods of teaching in their home disciplines.
- They showed no sign of being intimidated by the technology.
- They were more interested in teaching and learning than in the technology.
- They experienced no problems with gaining access to computer laboratories equipped with current (though not leading-edge) technology, and in these laboratories, there was at least one computer for each student.
- They had access to a modest degree of technical support.
- They had personal access to computers for private and professional purposes.
- They had only modest organisational support. There were others on staff at Outeast College responsible for maintaining the facilities and providing limited point-of-need support (though repairs and faultfinding is not especially responsive), but apart from this, there was no organised support. There was no organised network of teachers who were implementing computer use in their teaching, and there were no formal staff development activities arranged or provided by the school.

An important, and affirming observation, is that at least in the conditions described above, Howard, Arlene and Geoff were able to deliver purposeful, structured lessons which enhance student involvement with the technology. However, whilst the basic competence of the pedagogy should be celebrated, it was equally true that the use of computers was frequently predictable, mundane, uninspiring and failed to exploit the full range of possibilities which the software offered.
In this study, only two problems have been identified as sufficiently critical for the classroom to be unable to re-organise in a way to allow computer use to continue: gross system failure and an understanding of the possibilities of the software so that the teacher does not run out of ideas with regard to what to teach. On the assumption that a desire to improve practice is a given, a further finding is that the most critical difficulties and concerns of the participants in this study would be alleviated by providing adequate technical support and increasing teachers’ knowledge of computers, together with an improvement of teachers’ pedagogical content knowledge (discussed below).

The last of the general findings is that the essential issues identified in this study transcend apparent differences such as year levels taught, subjects taught and subject subcultures. In this respect, the participation of three teachers with heterogeneous backgrounds has led to a better understanding of self-taught computer-using teachers.

**Discussion and Findings Relating to Teachers’ Knowledge**

What I have come to view as a pivotal finding of this study is that teachers’ knowledge, in all its forms and constructions, is a powerful influence on the pedagogy of self-taught computer-using teachers. The influence of content knowledge, pedagogical content knowledge, and practical theories of teaching on the pedagogy of the participating teachers and some consequences of these are discussed in this section.

**Content Knowledge**

Both international and Australian research has identified that teachers’ knowledge of computers is frequently acquired, in large part, through being self-taught (Meredyth et al., 1999, p. 146; Plomp & Pelgrum, 1992; Shears, 1995). In the light of work by some scholars (Jaber & Moore, 1999; Becker, 1994; Larner & Timberlake, 1995), this might be considered to be problematic. Becker (1994), for instance, has found that formal training in using and teaching with computers was an important predictor of computer use.

A good understanding of the relationship between content knowledge and pedagogy in general, however, is in its infancy (Borko & Putnam, 1995, pp. 43-46). Interestingly, and somewhat counter-intuitively, Whelan (1992) found that content knowledge (in that case, of Legal Studies) was not important in order for teachers without a background in the discipline to satisfactorily teach the subject. The teachers in Whelan’s study were able to base their pedagogy on factors other than a detailed knowledge of the content of the subject.

Johnson (1997) has suggested that a minimal level of knowledge and skill (e.g. basic word processing) is important for teaching with computers, but beyond that, much more important was what he termed an ‘openness’ to using computers, a readiness to learn about them whenever possible, and an interest in improving pedagogy. My interpretation of the data on Geoff, Arlene and Howard is that they had reached an important (but quite hard to define) minimum level of knowledge; they each stated that they believed they were sufficiently knowledgeable to use computers for the particular purposes which they had chosen.

These same data show that a lack of knowledge was a particular influence on Arlene, Howard and Geoff’s use of computers - not so much for its own sake, but because of the implications it has on confidence and whether a rewarding classroom experience can be ensured. This is consistent with
other studies in the literature. Whilst the relationship between content knowledge of itself and pedagogy is unclear, it seems that content knowledge is an important influence on other factors which in turn influence pedagogy, such as confidence (see later in this paper), planning and implementation of classroom practice (Tobin & Espinet, 1989) and pedagogical content knowledge (see the following section). Whilst acknowledging that the direct relationship between content knowledge and pedagogy is not well understood, and possibly less important than other influences, I would not argue that minimal knowledge of computers is the limit to which we should aspire. Indeed, Stager (1995) convincingly argues that practices which promote minimalist levels of knowledge deprive teachers of the type of intellectual empowerment which their students experience when using the computer as a vehicle for constructing knowledge; to attend to content knowledge is fundamentally enabling.

What is to be argued out of the study of Geoff, Howard and Arlene is that the pedagogy of computer-using teachers is most likely to be more powerfully influenced by factors other than mere content; that the less tangible dimensions of teaching and professional development, those aspects which ought (but possibly aren’t) part of the month-by-month life of the professional educator, are more likely to be the powerful mechanisms by which teachers can effectively adapt to using computers in their teaching. It is these which are discussed in the remainder of this section.

**Pedagogical Content Knowledge**

Some important insights into teachers’ use of computers are gained by a consideration of Shulman’s concept of pedagogical content knowledge. This is the notion that there is a particular form of content knowledge that embodies the aspects of content more germane to its teachability. Wilson, Shulman and Richert (1987) state that,

> successful teachers cannot have an intuitive or personal understanding of a particular concept, principle or theory. Rather, in order to foster understanding, they must themselves understand ways of representing the concept for students. They must have knowledge of the ways of transforming the content for purposes of teaching ... teachers must have a knowledge of the subject matter that includes a personal understanding of the content as well as knowledge of ways to communicate that understanding to foster the development of subject matter in the minds of students. (p. 110)

Shulman (1986) further explains that

> within the category of pedagogical content knowledge I include, for the most regularly taught topics in one’s subject area, the most useful form of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations - in a word, the ways of representing and formulating the subject that make it comprehensible to others. Since there are no single most powerful representations, the teacher must have at hand a veritable armamentarium of alternative forms of representation, some of which derive from research whereas others originate in the wisdom of practice. (p. 9)

These quotes illustrate that content knowledge is a necessary precursor to pedagogical content knowledge - pedagogical content knowledge is a restructuring of content knowledge, “a unique interface of content and pedagogy, an understanding of how topics and skills can be organised and taught to pupils” (Kagan, 1992, p. 158).
Just as Grossman (1989) notes that it is important for new teachers to be able to re-think subject knowledge from a pedagogical perspective, and Albion (1996) has drawn attention to the need for student teachers to rethink subject knowledge from a “pedagogy-with-computers” perspective, it seems reasonable to suggest that the same might be true for teachers who are new to using computers. In the context of computer use, Olson (1988) has coined the term “ideaware”, which he describes as follows:

software is, at the heart, “ideaware”, and the more the “idea” of the software is transparent to the teacher, the more likely the challenge to “ideas” in everyday practice can be discerned by the teacher ... (pp. 55-56)

Such a conception of ideaware is essentially that of pedagogical content knowledge.

After a year of observing Arlene, Howard and Geoff, I believe that each of the teachers faced difficulties in their teaching with computers because of their abilities to re-think subject/content knowledge from a “pedagogy-with-computers” perspective. Arlene, for instance, demonstrated a fairly good, intuitive grasp of ideaware across a range of software types. I did not see her try to use any of the more sophisticated functions of the software (she did not use desktop publishing for the production of a newspaper, for instance), and so I interpret that the ways in which content was re-presented using computers was to be found in breadth rather than depth of software type. Howard was perhaps the most conscious of the limitations of his knowledge about software, but he used this relatively limited range of software functions as an aid to a range of teaching/learning activities.

Geoff was very concerned that his knowledge of software was so limited that he would run out of material to teach. He seemed to have a limited appreciation that the same range of computing skills could be recycled as a component of different teaching/learning activities, and, his basic concern highlights a limited grasp of software as ideaware.

Practical Theories of Teaching

In his review of the literature on teacher thinking, Marland (1995) comments that it is broadly accepted that the classroom actions of teachers are guided by internal frames of reference deeply rooted in personal experiences, especially school-based ones, and are based on interpretations of those experiences. Because they directly relate to a teacher’s practical action and possess considerable explanatory and predictive power for the teacher concerned, in line with Marland, Kennedy, Forlin and Sturman (1997) I use the term practical theories of teaching to describe these internal frames of reference.

A teacher’s practical theories embrace a wide variety of factors: commitments to educational goals, beliefs about learners and learning, the students, the subject matter taught, roles and responsibilities, conceptions of different disciplines, the role of the teacher, images of ‘good’ and ‘not-so-good’ lessons, notions of how one should act, and knowledge of strategies and situation-action consequences (Clark, 1988; Marland, 1994). They develop out of personal experiences - while growing up, going to school, travelling, working and interacting with people (McCutcheon, 1992).

As I observed and worked alongside Geoff, Howard and Arlene, patterns in their classroom work and in their work life as a whole gradually became apparent. I have used these, together with what they told me about what they valued, to construct what I believe were the themes which were at the heart of the their teaching, including their teaching with computers. Geoff’s pedagogy reflected him valuing: participation for all students and an atmosphere of belonging and
achievement; a belief that learning should be enjoyable; an endeavour to value students and knowledgeable participants and to create opportunities for experiential learning; and working for positive and affirming relationships with students. Moreover, I have come to see two themes as powerful forces at the heart of his pedagogy: firstly, his skills as a problem-solver, modifier, innovator and ad-libber, and secondly his concentration on students’ achievement of outcomes. These practical theories of teaching have been formed out of the cut-and-thrust of Geoff’s realities of having worked exclusively at Outeast College (he referred to himself as a “product of the school”), and they address general issues of education and his day-to-day survival as a specialist.

Howard’s pedagogy reflects him valuing: a student-centred approach which actively engages students in their own learning; minimising teacher talk; maximising student talk and activity; valuing academic work; assisting students to gain confidence and experience success and developing a genuine personal relationship between teacher and student. In addition to these, which are general beliefs about good ESL teaching and learning, I also see “breaking patterns” as a major theme which spans his professional activity. This practical theory of teaching has arisen out of his deep consideration of ESL teaching and learning and what he seeks to do and be as a professional.

Arlene’s pedagogy reflects her valuing: the motivation of students; ensuring that all students are able to express a point of view; being understanding; being approachable; students not being bored; students taking pride in their work; students producing pieces of work of good quality and quantity; academic enterprise; and group work. I see her use of computers driven primarily by a desire for good quality presentation of work (which, unlike Howard and Geoff, is not a driving force at the heart of all her teaching). I find this to be quite a narrow and not easily extensible vision for computer use. Indeed, I have found almost a lack of consolidate theme in Arlene’s teaching, which could be attributed to range of factors, including my skill as an interviewer, observer and interpreter of data. It might also be related to her teaching experience, which is rather less than Howard’s or Geoff’s. Teacher development models (Huberman, 1989; Kagan, 1992) show that a consolidation of a sense of self-as-teacher is a key feature of the earlier (up to 10) years of teaching.

From the perspective of the teacher as a professional sense-making constructivist with deeply held and often implicit practical theories of teaching, achieving genuine change in pedagogy will be difficult. Indeed, Olson (1988a) has argued that it is perhaps more productive to seek explanations for why teachers do what they do with innovative ideas, rather than bemoaning a lack of real change. Thus, a constructivist perspective such as this provides an explanation of why innovation is difficult. In addition, it helps us understand what pedagogy occurs when a teacher teaches a subject which is outside his/her realm of experience.

In Louden and Wallace’s (1990) study of teachers with no background in the content or pedagogy of Science yet were in the position of teaching Science, it was observed that pedagogy in an unfamiliar subject area was appropriated directly from the teaching of a discipline with which teachers were more familiar. For one of their teachers, Bill (an English teacher) they comment, the goal and content were science, but the pedagogy was English ... (p. 185)

and for another, Malcolm, a Craft teacher, they consider:

his Science lessons took the form with which he felt most comfortable. Like Bill’s drift towards English, Malcolm’s drift was towards Craft. (p. 186)

Indeed, what I have seen of Howard’s, Geoff’s and Arlene’s pedagogy with computers was not very different in style or form to their work in the regular classroom, but their intention - if not always their pedagogy - aligned with their practical theories of teaching.
For Geoff in particular, there was remarkable consistency in his pedagogy in the computer laboratory compared with his regular (PE) classroom down to quite a fine level of detail: the pattern of his lessons, how he managed the issuing of equipment, the monitoring of student work and behaviour, and the arrival and dismissal of classes. Because his pedagogy arises substantially out of his work as a PE teacher, Geoff is essentially a PE teacher who is teaching computing. It is perhaps more accurate to regard ‘Geoff as Geoff’ no matter what he teaches: he has developed his own particular style and pedagogy which is essentially unchanged regardless of context and he can operate almost on ‘remote control’.

The consistency of Howard’s pedagogy is not as marked as Geoff’s. ‘Breaking patterns’, however, is a theme which unites much of what Howard was striving to achieve in his professional life, and his raison d’être of computer use is to break the pattern of uninspiring and abbreviated writing. Howard recognised that classes in the computer laboratory ‘look’ very much like those in the regular classroom, yet Howard nevertheless had to develop some new routines and practices so that his lessons would run smoothly. Howard was conscientious about developing his pedagogical content knowledge, and he actively sought ways to improve his teaching of ESL with the computer: the ESL content, values and even method are the constant, whilst computer use is the variable with which Howard experimented. The use of computers did not challenge his core understandings of ESL: past pedagogy determines computer pedagogy.

By attending to Howard’s emancipatory intent of “breaking patterns”, it can be seen how practical theories of teaching provide a very broad and powerful framework for considering further possibilities for computers in teaching. For instance, if one wants to improve a students’ grammar or vocabulary, then presumably there are computer programs which can help with that; if one is searching for a reason for using electronic mail, then Cohen and Riel (1989) have shown that this technology can lead to improvements in the quality of students’ writing. By extrapolation of this argument, a relationship between practical theories of teaching and pedagogical content knowledge can be suggested. The application of pedagogical content knowledge to computer use implies that it is a matter of acquiring a broad and diverse repertoire of strategies of how the use of computers can be deployed in the teaching of a particular concept. However, I would suggest that a teacher will only embrace those strategies which allow him or her to express his/her practical theories of teaching - Howard would most naturally embrace new strategies which enable him to further his emancipatory interests, Geoff would most naturally embrace strategies which enable him to continue to present himself as a problem-solver and Jack-of-all-trades.

It is this observation which gives rise to the title of this paper: in order to help teachers improve their use of computers in teaching, we must ‘get their drift’ - discern the practical theories of teaching, which are deeply connected with their very sense of themselves as teachers, and work towards identifying computer applications and pedagogies which align well to these. At several schools that I have visited, there has been a small number of very high profile and creative teachers who have been held up as exemplars to their colleagues and the wider educational community. I sometimes feel that the subtext to this goes something like, “become like Jane, and that way, you will use computers well in your teaching”. Teacher educators need to be careful not to be too intent on trying to re-shape a Howard, a Geoff or an Arlene into a (hypothetical) Jane. Rather, there seems to be a good deal of merit in adopting a line of thinking from Gestalt psychology, as Robinson (1989, p. 280) did, to argue that change occurs when one becomes what he/she is, not when he/she tries to become something that he/she is not; that change in other people is most likely to be facilitated by abandoning altogether the aim of trying to change them and giving them instead the opportunity to be fully themselves, a vision of the choices around them, and the support to embrace any venture they choose. In other words, to help a Howard become the best Howard that he can be, and help him clothe himself in the most exciting range of computing applications that he can comfortably wear. That is not to deny the enthusiasm, ideas.
and strategies which can be learned from listening to and observing exemplary teachers, but we
must seek to ‘get his drift’ and ‘go with his flow’, or the best ideas will fall on deaf ears.

This argument is not intended to lessen the need for continual teacher improvement, including
that very deep form which helps teachers understanding the implications of their practical theories
of teaching for a particular situation, and possibly even reconceptualise their practical theories of
teaching. Space does not permit a sufficient discussion of the implications of Howard’s, Geoff’s or
Arlene’s practical theories of teaching for teaching with computers, but examples from other
studies illustrate the importance of such a consideration. Louden and Wallace (1990) comment on
two teachers in their study:

Malcolm’s silent ... lesson prevented students from making their own ideas
explicit or generating alternative interpretive models. Similarly, Bill presented
the experimental method as if it were linear and rational, and his stage-
management of students’ observations prevented them from reconstructing
their own understanding of scientific activity. (p. 187)

In this case, because pedagogy originated from a more familiar subject area, it actually did a
disservice to the content being taught. In contrast, Whelan (1992) found that the nature of the
subject area (Legal Studies) matched very well with teachers’ (lack of) experience:

the teacher’s lack of base for authoritarian knowledge transmission, their
depth of teaching and life experience, and the offer of relevant knowledge to
study by the syllabus in a discipline which mandates contestation ... combined
in a unique opportunity. (Whelan, 1992, abstract)

It cannot be assumed that practical theories of teaching will necessarily do a disservice to the
teaching of content knowledge which is unfamiliar, however they will always hold implications for
how the unfamiliar is both understood and taught.

**Teacher Learning and Reflective Practice**

McCutcheon (1992), quoting Kolb, considers that reflective practice occurs when
immediate concrete experience is the basis for observation and reflection. An
individual uses these observations to build upon an idea, generalisation or
‘theory’ from which new implications serve as guides in acting to create new
experiences. (p. 83)

Following my observation of them throughout the year, the participants in this study could not be
considered to be particularly reflective. To the extent that they are, they are concerned with
pragmatic and technical issues, rather than the development of their own knowledge. I have
interpreted that it is their knowledge, their practical theories of teaching, which are the strong
guiding influences at the heart of how they teach with computers, but the presence and
implications of practical theories of teaching were almost completely unrecognised by them.

In the absence of subjecting their knowledge and learning to scrutiny, it is hardly surprising that
there is little change in their teaching with computers over the course of the year. When left
substantially on their own to teach with computers, the participants in this study did not reflect,
and certainly not on matters of deep importance, such as their role, philosophical orientation,
practical theories of teaching and the implications of these when applied to teaching with
computers. As a result of my studying Howard, Arlene and Geoff, it is my firm conviction that to
leave teachers alone to develop curriculum and pedagogy with computers - to allow them to be

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Attitudes and Confidence

The importance of attitudes and confidence towards computers is mentioned here because literature (Marcinkiewicz, 1993/4; Marcinkiewicz & Regstad, 1996; Albion, 1999; Borchers, Shroyer, & Enochs, 1992; Enochs, Riggs, & Ellis, 1993; Jacobsen, 1998; Olivier & Shapiro, 1993) reveals that confidence is related to a range of other factors, notably: knowledge of teaching methods, knowledge of the technology, access to the technology, and classroom experience with computers. Studies such as these have consistently identified teacher confidence as an important contributing factor to a teacher’s decision to use computers in his/her teaching. Particularly, perceived self-efficacy - “individual’s beliefs about their ability to perform particular actions or attain certain goals” (Gorrell, 1990, p. 77) - is consistently reported as a good predictor of computer attitudes and usage patterns.

Arlene, Geoff and Howard each bear the hallmarks of being self-efficacious. They describe their class settings in terms of warm, interpersonal relationships, emphasise academic endeavours, and are willing to take on innovations and new approaches to teaching, and persevere with the challenge this presents (Gibbs, 1999), and are willing to take on innovations and new approaches to teaching, and persevere with the challenge this presents (Gorrell, 1990; Gibbs, 1999). Perhaps it is because the three participants were fortuitously self-efficacious that the study was able to see beyond issues of confidence to those of knowledge. However, what stands out from observation of Howard, Arlene and Geoff and a reading of the literature is that confidence stands alongside knowledge and reflection as important influences on the pedagogy of computer-using teachers.

SUGGESTIONS FOR FUTURE PRACTICE

The study of Howard, Geoff and Arlene has revealed the importance of teachers knowledge to the pedagogy of these teachers. This may or may not be true for other teachers, contexts or situations. By conducting the study, however, I have been able to formulate a theoretical knowledge base for my work in the professional development of teachers who are learning to use computers in their teaching, which is continuing to emerge as I continue to work with in the same field. This knowledge base is a work in progress, consisting at this time as a series of propositions or ‘suggestions to myself’ of things which I think would be worth attending to when working with computer-using teachers.

I will aim to

- provide teachers with a frequent, rewarding and recurring classroom experience, because that will build confidence and assist in the development of pedagogical content knowledge;
- encourage teachers to be sufficiently engaged with the technology to present challenges to the prevailing concepts of the scope and content of the technology;
- provide opportunities for teachers to increase their knowledge of the technology, because it will help them improve their confidence with the technology, increase the appreciation of the value of computers for teaching of their subject area (pedagogical content knowledge), and help them experience success when working with the technology;
- provide adequate technical support for teachers because that will assist in presenting a rewarding and classroom experience;
• create strategies to influence self-efficacy beliefs which includes enabling other colleagues to demonstrate that they have extended and rewarding experiences using computers, and providing examples in verbal or written form of other teachers having extended and rewarding experiences using computers;
• create strategies to improve pedagogical content knowledge which include developing knowledge of the technology, reflection on case study material, immersion in the field, and opportunities for reflection;
• acknowledge that some teachers are not personally and psychologically disposed to adopt innovations, and I will not expect that new ideas must invariably succeed; and
• encourage teachers to be reflective practitioners, identifying their practical theories of teaching, and to consider the implications of these on teaching with computers.

This list of propositions will continue to evolve as I work with other teachers and test out these ideas in practice. They form the basis of a professional development program for a particular group of teachers with whom I am presently working. This group of four teachers of Studies of Society and Environment (SOSE) have been challenged by all their classes for the year being scheduled into a computer laboratory. The idea was to contrive some longitudinality and to invite the teachers to think ‘is there a good reason why I shouldn’t use computers in this lesson’ rather than hoping that occasional use will lead to rethinking pedagogy and curriculum.

However, using the above propositions as the framework for a professional development and support structures for the SOSE teachers is experimental. This new venture is providing an opportunity to ‘test’ the propositions and refine the set. I fully expect new ones to be added, and others to be more or less important than I perceived them to be for Howard, Arlene and Geoff. Thus, my final recommendation to myself is to continue to investigate the influences on the pedagogy of computer-using teachers. It is only by appreciating the full depth and breadth of issues facing the computer-using teacher, and by choosing to deliberately learn more, that improvements in the professional development of computer-using teachers can be made.

REFERENCES


