

What does 'enhanced learning through computer-based technologies' actually look like?

Debra Hayes, University of Technology, Sydney

Lyn Yates, University of Technology, Sydney

Abstract

A multi disciplinary interagency team is currently undertaking research in NSW government schools funded by the Australian Research Council through the Strategic Partnership with Industry - Research and Training Scheme (SPIRT). In this paper we outline the early stage problems associated with researching the question: what does enhanced learning through computer-based technology actually look like? We argue that many "commonsenses" have come to be associated the integration of computer-based technologies in schools. At the core of these is a pervasive belief that technology will improve learning. Our efforts to pin down the purpose of our research have been made more difficult by the fact that *we are trying to get at good practice, in a context that is changing*. We outline three changing sets of practices in which this is *true and* important for our project and for thinking about technology and schools. These practices relate to how technology functions in schools, what counts as knowledge and is valued as performance, and how new subjectivities and relationships mediated by technology.

Introduction

'Enhancing learning through computer based technologies' is the title of a research project being carried out by a team of researchers from the University of Technology, Sydney and NSW Department of Education and Training (DET). The project was successful in drawing funding from the Australian Research Council through the Strategic Partnership with Industry - Research and Training Scheme (SPIRT), and we assume therefore was reasonably competent in setting up a design, questions, methodologies and justifications of applied purposes that meet reasonable research standards. The team itself has quite a range of experience in the area it sets out to investigate: a professor of interactive and multimedia learning; an academic fresh from another major and complex study of effective pedagogies as well as from a pilot study related to the current project; another who is experienced exploring what learning and understandings look like in relation to young people from a range of different backgrounds; a researcher who has been involved in applied projects relating to computers in the school system for many years, directing different kinds of research and developing materials from these; another who has been working on applied design issues related to computers and distance learning in schools. But this paper isn't about what we've achieved; and it isn't about an immediate answer to the question we set up in the title (though we hope more on that is to come). What this paper is about is the problem of embarking on research into learning at a time when the nature of learning is being fundamentally reconsidered, and the contexts in which it takes place are undergoing ongoing change.

Examples of the context of discussion could be drawn from virtually any day's newspaper. Taking just one example, a recent article in the IT section of a major daily newspaper carried the headline, "Experience the power of e-learning". The article described how the "horse and buggy days of education" are being challenged by a "learning revolution" that is "turning education on its head". Such inflated expectations often follow technological innovations.

According to Zastrocky "the hype cycle" of technological innovation commences with a peak of inflated expectations, followed by a trough of disillusionment, a slope of enlightenment and finally a plateau of productivity. Despite some cautionary warnings about computers and their uptake (Armstrong & Casement, 2001; Cuban, 1998) the plethora of "commonsenses" that have come to be associated with computers in schools suggest that the we have not yet reached the peak of the "hype cycle". Very widespread is a belief that technology will improve learning, but there is quite a gap between the pervasiveness of this general mantra, and the inchoateness with which people address more specifically in what sense learning will be improved by technology.

To take a recent example, when the NSW Treasurer announced a State Government plan in 2001 to commit \$21million over four years to provide an email account for every teacher and student in NSW he claimed that, "in years to come, I believe people will look back on this as the year we began a revolution in NSW schools". The Treasurer went on to say that the email accounts, "would transform how children learn" (Sydney Morning Herald, May 30, 2001). However, when pressed to explain how the email accounts would transform how children learn he referred the question to the Minister for Education. This was parodied in a news report of the announcement:

It turned out [the Treasurer] had little idea how e-learning accounts would work or how they differ from the Internet and extensive education Intranets and free email accounts that exist. Instead, he kept insisting the media should ask the ...Minister for Education. "I'm one of those people who still writes his Budget speech with a pen in hand and a piece of paper so I think I will leave the details to John Aquilina's people" Mr Egan said modestly. And, er, no he doesn't have an email account at home himself.

It is unlikely that even the Education Minister could give a satisfactory response to this question because there is very little *evidence* that educational technologies are being used to *transform* learning. Certainly a few schools (and education systems) publicize stories about their use of laptops or other expensive hardware provision as part of their self-marketing. But the US-based Secretary's Conference on Educational Technology, that evaluated nearly three decades of research, concluded that "technologies by themselves have little scaleable or sustained impact on learning in schools" (Honey, McMillan, & Carrigg, 1999). Another study, taking place in the very favourable location of Silicon Valley, found that, notwithstanding a climate of rhetoric to the contrary, new technologies were hardly being used at all (Cuban, 2001) and Fiske argues that, "the only significant technological innovations of the 20th century to find a secure place in schools are the loudspeaker, the overhead projector, and the copy machine" (p. 11).

Nevertheless, there is a widespread climate of expectation about the new technological era, and schools and school systems are grappling with the expectations, and competing as to what they try to put in place. It is a period when many people (from parents to bureaucrats) really want to know what is 'effective', what is 'good practice'. It is in this climate, that the NSW DET developed an initial pilot project titled *Net Gain?: The integration of computer-based learning in six government schools, 2000* with some of the researchers involved in the project being discussed in this paper, then went on to jointly develop our application to research 'Enhancing Learning through Integrating Computer Technologies in Schools', which in turn secured some commonwealth ARC funding towards the task.

In our project summary we stated that:

This project will provide rich new qualitative data about the form, impact, effectiveness and differential effects of computer based learning (cbl) across a range of NSW schools. The project's distinctive focus is on assessing the learning activities that make use of cbl, as distinct from the ways in which cbl is used in schools...It will describe evidence of effective practices and valuable information on how inequalities are being reconstituted by the introduction of cbl.

In developing the application, we were aware of some of the problems our introduction has signalled, particularly the problem of the varied and uncritical as well as often unspecified ways in which 'learning' is constituted in discourse about technology. We made some initial decisions as to where we were coming from.

First, our project was to investigate new technologies in schools, but our central emphasis was to be on learning. This was not to be primarily a project about what *could* be done with *new technologies*, or about whether new technologies and software look different and exciting; but about what was happening with *learning* when new technologies *are* being used. In this respect, de Castell, Bryson and Jenson's framing of technology is useful. They are critical of what they describe as "the typically under-theorized and unproblematic uptake and mis/uses of new technologies in school-based settings". They claim that:

one way of rethinking the purposes and uses of new technologies for education might be to re-position common theoretical questions, asking not how education might use these new tools, but instead asking what educationally, they might offer; instead of theorizing educational technology, then, the focus becomes an educational theory of technology.

Secondly, in keeping with our interest in what happens, rather than what might happen, we wanted to take seriously the specificities of different school contexts, so we decided to take a multi-site case-study approach in which we could see a number of teachers and classrooms in the context of their school and its particular policy, culture, emphases, administration, and in which we could revisit this over time.

And thirdly, we wanted to take subjectivity and difference seriously, to try to see learning as something in which different types of students might engage, be marginalized or included, learn values and a sense of themselves, grow their success or multiply their sense of being behind. But we found, when we came together as a team, that this initial thinking-through of possible agendas in relation to new technologies and effective learning, had only scratched the surface of the issues to be confronted in carrying out empirical research in this area.

In the remainder of this paper we want to discuss why some of our previous experiences did not seem sufficient when we came to "operationalizing" our case-study work. We soon found that not only did the various members of our team come with different understandings of what it would mean to show 'what enhanced learning looks like'; but that the issue of change in both the context of the research, and the broader discursive agendas about new technology and learning were a central problem for designing the case-studies and the school observations.

One of the commonplaces of contemporary research is to call for an interdisciplinary team, and to 'bring together academic researchers and practitioner researchers'. Having done just this, what we soon found, through many team meetings, and debates about our first year of fieldwork experiences, was some sense of just how many different ways the imperative of the question, "*What does enhanced learning through computer-based technology actually*

look like?", may be interpreted. We could, for example, take "enhanced learning" as a proxy for a known outcome state (test scores, for example; or knowing 'more'; alternatively, particular models of 'deeper' compared with 'shallower' or "richer" compared with "thinner"; or endpoint orientations to being a lifelong active learner as compared with simply having absorbed some information now) and go out to find examples of practices using new technologies where that endpoint state results. Or we could follow the new literacies, new knowledges path, and take the question about 'enhanced learning' as one where we are trying to investigate whether there are some *new* processes and outcome states being produced. If what learning looks like is taken as known, "enhanced learning" means different steps on an existing ladder, learning that is more of the same or better of the same. If new forms of learning are emerging, "enhanced learning" means learning that is different. And in both cases we could equally dwell on our promise to show what such practices "look like", and worry about whether the question is adequately met by "describing" what happens (that is, using interpretations of the empirical that would be broadly shared by observers in the same culture), or whether we need to think about other steps we have to take to actively reveal the processes of learning within that scene. In the remainder of this paper, we want to elaborate what some of these issues look like as methodological as well as substantive problems in researching current practices with new technology in schools.

Orienting a narrative within changing sets of practices

In this project we are trying to get at good practice, but in a context of change, and this is particularly problematic for empirical research. There are (at least) three senses in which a context of change is important for our project and for thinking about learning through technology in schools. The first of these is the complex and changing way in which technology is present in the school environment - that is, ongoing and non-uniform changes in the material and human *resources* with which schools and teachers are working. Technology itself is changing almost faster than we can study and write up our accounts of it but, perhaps of more relevance to schools, there is also great variation in the reliability and type of technology available, wide variation in the skills of administrators, teachers and students who are attempting to use technology and limited amounts of curriculum support in the form of syllabus documents and assessment techniques that incorporate, or as a minimum mention, technology. So do we research what is, or what might be? Or, put another way, in what way can research on what is happening in a particular context now, be of use in some near future which is likely to be quite different?

A second changing context is that of the broad social and economic milieu: the types of jobs that exist, the types of *knowledge* and skills that matter or may matter. These potentially undermine the certainty with which teachers and researchers believe that they know what effective learning is - and foreshadow likely ongoing changes in formal curriculum prescriptions for schools. What types of learning will be valued in the new workforce? Are these what schools are currently assessing?

The third changing context is *students* and what they bring to the classroom. What does 'cultural capital' look like in relation to the new technologies? Is its distribution similar to the distribution of disposition that previously differentiated who did best in education? How do cultural and gendered forms work themselves out in these environments? Are the patterns we see now, likely to change, for example as computers become more widely dispersed?

All these are significant methodological issues for how we might approach a study of current practices, and what we might hope to get out of it. Here are some concrete ways such issues raised themselves for us in the first year of this project.

1. *The problem of using and building on existing research models:*

One conception guiding the initial proposal (in terms of some ideas about how classrooms would be observed and described, and in terms of how 'effective learning' might be conceptualized) had been the large scale study known as the Queensland School Reform Longitudinal Study (QSRLS). This study is located within the literature on 'effective' schools which has appealed to policy makers administrators and parents because it attempts to identify pedagogies, school contexts and external conditions that are linked to improved student outcomes (Lingard, Hayes, & Mills, 2002; Newmann and Associates, 1996). Potentially, working with a model such as this would be one way to select examples of "good" cases to describe, and one way to organize the analysis of classrooms, so that findings could be compared with other previous studies of effective practice. So one idea had been to look for cases of schools and teachers using new technology in ways that reflected the conditions that these previous studies had found to be associated with high outcomes for students; intellectually demanding, socially supportive learning environments that value difference and are connected to the world beyond the classroom.

But trying to repeat this focus, we decided before too long, is limiting the potential and purposes of this study. It puts the emphasis too much on what has been rather than what is changing; and what we know rather than what we don't know. It focuses on teachers and learners, but not directly enough on the changing forms and contexts in which our study is interested; and it closes off rather than opens up questions about what significant learning looks like now and in the emerging future. How, then, do we observe and describe classrooms?

One way we are responding to this question is to conceptualise the task as a narrative *exercise*. The standardised methods of observations common in school effectiveness studies are designed to code, measure and compare observations against sets of standards. In the classroom observations conducted as part of the QSRLS, the pedagogical practices of teachers were placed under scrutiny. However, our purpose is to describe pedagogical practices mediated by technology in order to place the nature of learning under scrutiny. Some questions that arise are: What is technology used for?; How is learning assessed?; What performances are valued? Our emphasis on learning recognises that not all learning may be observed by changes in behaviour and that learning may be unplanned and unanticipated. Hence, we are developing a narrative form of classroom observations that is developed by the research team in consultation with teachers and students. The classroom narrative will describe a range of e-effects such as:

- **Who** is the authority; Who is expected to listen and allowed to speak; Who determines activities, groupings and transitions. Who judges performance.

- **What** is said about technology; learning; and difference. What counts as knowledge and performance. What links are made across the curriculum and beyond the classroom.

- **Where** is control located. Where is knowledge produced.

- **When** are computers used and able to be accessed. When is communication permitted and for what purpose.

- **Why** are computers used.

2. *The problem of the usual ways of selecting good cases within a school system*

Some similar issues apply to the initial practical step of working with our partners to select suitable sites for study. Within education systems, a common way to select good sites for case-studies of good practices is to use a combination of asking technology advisers and district officers and teachers to nominate schools they think are doing good things, and to cross-reference a bit with 'hard data' on school patterns of outcome relative to demographic intake. This might be a first step, but it does not get us far enough in making our decisions, because there is limited agreement on what is a "good thing" when learning through computer-based technology, and so we are often pointed in the direction of flashy uses that appear to have fairly superficial learning outcomes. When parents and politicians first see a powerpoint presentation, or a school having its own website, their sense that it is doing good things is more an appreciation of what the technology designers have accomplished, than of whether the students learning has been significantly enhanced. Schools that are drilling existing outcomes best (producing the best current test scores) are also not necessarily the best cases for insights into "effective learning practices". They may be useful examples for one dimension of that, but not for others (are foundations for future valued learning being enacted?). As well, we have to confront issues such as, do you look for *current* "good practices" and how these have come to be, or do you try to study practices that are far from being 'lighthouse' examples, but developing? Are we looking for model cases, or are we looking to understand the ongoing imperfections of the conditions in which teachers and schools work? In what ways can the selection of sites have regard to rapid changes of software and technology?

3. *Some limits of 'case studies of innovation'.*

In the field of educational research, qualitative and case-study work became much more popular from the late 1970s and through the 1980s, partly because this was seen as a form of research that could speak to teachers rather than policy-makers, and partly because it was seen as better able to study 'innovation': change in process:

There is no play that is 'director-proof'. Equally, there is no innovation that is 'teacher-proof' or 'student-proof'. If this is acknowledged, it becomes imperative to study an innovation through the medium of its performance and to adopt a research style and methodology that is appropriate. [...] the evaluator concentrates on 'process' within the learning milieu, rather than on 'outcomes' derived from a specification of the instructional system.

Parlett & Hamilton, 1977, pp.21-22.

"Rich description" was the path to enlightenment. And this is still one guiding conception of our present study. But, as more recent research debates have made clear, "we do not so much *describe* as inscribe *in discourse*" (Lather, 1991, p.90). What we see and how we name things is shaped by the conceptions and agendas we bring to it. There is a difference providing rich descriptions from familiar guiding agendas (disadvantage, words and what they construct, explicit and inexplicit pedagogical devices), and ones where, to some extent, it is not clear what aspects of the classroom using new technology we should even be looking at.

So in taking on an attempt to study classrooms and school contexts, we have been aware we would need a combination of existing and emerging descriptive frameworks. In the first year of our fieldwork, we have been attempting to make use of the different backgrounds and expertise of our team, by having always at least two or three members observe a particular class, and in our debriefing, to try to get some sense of what they "saw" differently,

in that. One issue that has been quick to emerge, is that we are much more confident we can identify poor pedagogy when we see it, than "enhanced learning" - though in the former case, we are not entirely of a common opinion.

4. *The problem of 'new knowledge'*

What *is* powerful knowledge (or high-level learning) *today*? The world is changing; what counts as knowledge is changing. Education departments keep rejigging their syllabuses; universities alter their faculties and subjects constantly so that they are almost unrecognizable. But even more importantly the issue of what is the fundamental knowledge, both content *and* competencies, that you now need for vocational success, or to be an active citizen, is also changing rapidly. James Gee, for example, argues that the new economy calls up a "shape-shifting portfolio person", and that skills in design and collaboration acquire new significance (Gee, 1999).

In our team, we are trying to keep a simultaneous eye on whether working with the new technologies seems to be advancing or not in relation to existing understandings of good pedagogy, good learning practices; and also to be looking for what is changing: what is now beginning to be constructed as legitimate knowledge and performance in school-based settings. What *are students* learning about *what* counts as knowledge, *how* you learn and do well? In our case we are using combinations of classroom observation, analyses of curriculum/software, interviews and debriefs with teachers, students, principals, and we are trying to get at these issues both directly and indirectly. Sometimes teachers tell us what new knowledge they see students as engaged in when they do a particular task; and sometimes we are making our own assessment - for example by looking at the assessment tasks the teachers are setting. But of course in all cases what we elicit or might elicit here is not simply an empiricist issue - to effectively observe new knowledges in formation involves dialogue with the broader research and argument about the nature of contemporary society, culture, work and social change.

In education most of the interesting work on new knowledge in relation to new technology has been associated with and developed by with those who work on literacy (see for example Green & Beavis, 1998 and Nixon & Kerin, 2001). But we think there is need for much broader work on the sociology of knowledge that is now emerging in the curriculum, and are hoping to begin in a small way to do this from our case studies across a range of KLAs and stages of schooling.

5. *Subjectivities and difference*

The remaining agenda we set out to investigate in this project was how *different* students are faring in the cases selected as representing good practice: trying to describe how new subjectivities and relationships are mediated by technology, and the associated shifts in power relationships. There is a long literature on inequalities and schooling, with some longstanding stabilities (class or SES) and some changing forms (gender), and it has been an issue of interest in relation to the organization of schools and school systems. The introduction of expensive technology and possibly new forms of competence, skill, knowledge, display potentially change some of the relationships with which we are familiar, but may also simply distract from the persistence of some of these; and this issue is one we wish to investigate further. But this is not an easy empirical task. The literature on inequalities in relation to computers is relatively small. We can observe classes, or particular students; we can hear how teachers and principals take up or fail to take up issues of difference, we can interview students. But it is difficult within a study which is organized around case-studies of school sites to closely follow the subjective experiences of students in those schools, the interaction of particular located biographies with what is now being

called out as important. One PhD study within our project will focus on issues of cultural difference in relation to new technologies and classroom practices, but there is scope for much more sustained work in this area.

This is an early paper from an ongoing research project, in a field of educational research interest that is beginning to draw exponential growth. We were driven to write the paper not only because we have found the research task to be much more difficult than anticipated, and not only because we think too much existing research gives too little attention to the terms in which their research problematic about this area is set up. We were driven too by the very strength of the discourses and commonsenses that now pervade public discussion about this area, and the size of the gap between the broad rhetoric and the practices of both school practice and research detail that we have encountered.

It is now widely taken-for-granted that we are in a period of "revolution" in relation to technology, that changes have impacted on practices in massive ways, that new technologies in schools are an important source as well as indicator of powerful educational practices. Our initial studies (both empirical and in the literature) lead us to conclude that at this point the changes in schools are much more modest and minimal than the rhetoric would suggest; that some take-up practices may 'dumb-down' learners; that, if there is a revolution, the educational thinking through of what is important about it, has a long way to go. But we do also believe that change (both in schools and beyond schools) is underway, and that it is important to try to get some sense of what is happening and might be happening in a more realistic study of actual schools, rather than of utopian, light-house lavishly funded experiments.

We wanted to approach the issue of 'effective learning' through a school-based, multi-faceted and contextual study because we think that the actual conditions of learning and of change are often missed out of the broad-stroke surveys, or narrowly focussed testing of learning. Pedersen suggests these latter approaches to research are more suited to the 'hard' technological sphere, as distinct from the 'soft' sphere of schools where the bulk of teachers' work is conducted. He cautions against the hard sphere becoming a model for understanding what is happening in schools because in the 'hard' technological sphere progress is conceptualised as cumulative, problems are solved and a great many people can make use of the solutions.

[However], in the 'soft' sphere, the cumulative process of making progress is much more difficult to realise. Part of teachers' work may well belong to the 'hard' sphere, but most does not. In the 'soft' sphere, teachers must often recreate what they want to accomplish. Their knowledge is much more tied to specific contexts. The problems of teaching and learning will not be solved once and for all; good teaching must continually be recreated.

Pedersen , 2001, p.62

How does technology impact on student learning? As with the class-size debate, parents (and systems organizer) would like an answer of the form 'if x technology, then y outcomes'. We prefer to see a more complex and ambiguous question: "What does 'enhanced learning through computer-based technologies' actually look like?" Hence, we have named our research *the e-effects project* to focus our attention on a broad range of positive, negative and negligible effects of technology integration in school classrooms. Whilst evaluation studies persist, our study illustrates what Honey describes as "an increasing recognition that technology is a crucial player in a more complex process of change that cannot be accomplished by technological fixes alone"

(www.ed.gov/Technology/TechConf/1999/whitepapers/paper1). Although some researchers

are asking different sets of questions, many of these are still underpinned by a frustrated form of a victory narrative that goes something like, the victory of computer integration is nigh but we are not quite there yet. There is also a pervasive belief in the inevitability of infinite broadband, unhindered access and transformative learning - in the not too distant future that is. By asking questions about the way technology functions in schools, what constitutes powerful knowledge in these settings and how new subjectivities and relationships are mediated, we are attempting to write a different type of narrative, one that tells it like it is and provides some basis for more realistic thinking about how it might be.

References