E-Learning Professional Development: 'Re-Envisioning' pedagogy in schools

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INTRODUCTION

In search of ‘authentic pedagogy’ our longitudinal three year study (2002-04, funded by the Australian Research Council Linkage Scheme) with children and teachers in Years 3, 5 and 7 of Tasmanian Government and Catholic Education Schools is providing a rich data set from teacher questionnaires and classroom observations. The problem is to identify the variables and their relationships in the space that brings together all the intersecting interests, both inside and outside schools in relation to Information and Communications Technologies (ICTs). In this paper we describe part of the research, which will result in the longer-term aim of developing, trialling and publishing, a professional development ICT related pedagogy package for teachers.

Learning communities are built upon the concepts of distributed cognition and social capital. E-learning has the potential to considerably extend learning opportunities for all members of a community irrespective of their geographic situation relative to administrative centres. E-learning also has considerable potential to change the primary role of the school building as a focal hub of community activity. Information and Communication Technologies (ICT’s) are driving social change. Implicit in this technological world is a move from a predominantly localised set of references systems to a predominantly fluid and global set of reference systems where change is ongoing and the need to adapt to new events is a must for effective citizenship. Helping the new knowledge workers to best manage these complex systems to assist their learning outcomes is the challenge for teachers and professional development programs. Nevertheless, the rapid technological changes makes it difficult to keep up with the process of developing recommendations for teachers and learners that are grounded in theory and well researched.

Emerging research supports the positive correlation of learning outcomes with access to ICT’s. For instance, the UK based Becta report (2001) Primary Schools of the Future – Achieving today analysed national testing results from 2110 schools in the UK inspected by the Office of Ofsted in 1998/9. Schools with very good ICT resources had higher proportions of students performing at the higher levels of achievement in English, Mathematics and Science. However, finding out what happens within the learning spaces, which bring together learner or operator and computerised content, is much more problematic. Much of the advice remains in the realm of conference proceedings in print and electronic formats (Bauer et al., 1999; Jona, 2000; Reushle et al., 2000). Journal publications are rapidly widening the debate although much of the current published research appears more related to adult learners and higher education (Fitzpatrick and Hardman, 2000; Snyder, 2000; Staley & MacKenzie, 2000; Truman-Davis et al., 2000). In brief, there is very little research to support the implementation of online learning initiatives into schools education (Becta, 2003).

In Australia, like other countries which see the future linked with new technologies, there is still not much evidence of relevant responses in teacher training (DEST, 2001). At the same time the Australian government has invested $68 million over five years (2001-06) in its

THE STUDY RESEARCH DESIGN OVERVIEW

In search of ‘authentic pedagogy’ our longitudinal three-year study seeks to identify the variables and their relationships in the space that brings together all the intersecting interests (see Figure 1). Our aim is to develop, trial and publish a professional development package for teachers that will offer training for authentic ICT related pedagogy.

Specific research instruments include:

- The Information and Communication Technology Classroom Climate Survey (CCCS). Distributed to all teachers of Years 3, 5 and 7 classes in Tasmania this teacher survey questionnaire assesses classroom teachers’ personal use of ICT, their perceptions of the children’s teaching and learning with ICT, and uses of online learning and perceptions of the school ICT resource environment. Survey outcomes are categorised to provide a broad measure of ICT opportunity which when linked with standard system wide literacy and numeracy results can be used to track the relative impact of the classroom computer environment on these learning outcomes.

- Classroom Case Studies: To complement system wide quantitative data gathering detailed classroom based case studies (N=50 over 2002-04 period) are providing the rich background information for testing emerging theories with teachers, students and school administrators. Data gathering instruments include individual teacher, student and principal interviews as well as class based information on ICT equipment, usages and teacher-student interactions.

Now in Year 2 of the study, data gathered are contributing to our understandings of the pedagogical processes taking place and also inform a working model for professional development – trials of which will commence late 2003. Our working theory is that online
learning or e-learning works best when the learner is in control of the process of accessing relevant content where and when it is needed. This suggests that the teacher’s style of agency is crucial in the delivery chain for improved learning. Hence, for the purposes of reporting in this paper we have chosen to narrow our focus to the teachers. We conclude with a working model for professional development.

RESULTS

**Selected Survey findings (2002: N=438)**

From the 438 surveys returned by teachers in 2002, 60 percent of respondents were older then 40 years and 73 per cent were female. Results revealed that 60 percent reported less that 10 hours of ICT professional development training during 2002. There were some age related differences. However, there were no statistically significant gender differences. Despite this low figure related to formal personal skill development, 88 percent reported having home computer access and 72 percent with Internet access. Teachers reported lower home access to computers for students – close to three quarters of the children in their classrooms and of these approximately 50 percent were reported as having home linkage to the Internet. Significantly, their figures are estimates of student access and appear to be below national estimates. The further surprise was that teachers reported that students generally spend less than one hour per week using ICT’s at school. The most likely computer usage in classrooms was for ‘publishing’ and ‘research’. The survey questionnaire also included two open-ended questions. Summary results of the coding of responses are reported below.

Open-ended Question 1: How does the computer help students achieve their learning outcomes across the curriculum?

The main themes to emerge were, in order of frequency, as follows (see Table 1):

1. Use of information/ Research
2. Enhances learning
3. Connectedness/ communication
4. Motivation to learn
5. Constraints/ concerns

Table 1 shows the percentage of respondents that mentioned each of the main themes and the frequency of mentions of sub-themes for Question 1. The majority of teachers mentioned aspects of themes ‘use of information/ research’ and ‘enhances learning’. A significant minority mentioned aspects of ‘motivation to learn’ and ‘connectedness/ communication’. Various ‘constraints/ concerns’ in regard to how computers help students achieve their learning outcomes were mentioned by fifteen percent of respondents.

- **Use of information/ research** covered three main sub-themes, the most frequently mentioned being ‘access to information’, ‘research and information management skills and tools’ and ‘presentation/ publishing’. Aspects of these three sub-themes were more frequently mentioned than any other theme.

- **Research and information management skills and tools** covered four main areas of responses in terms of how computers help students achieve their learning outcomes across the curriculum: research skills and tools; manipulating and editing information; evaluation/ critique of information; and organization of information.

<table>
<thead>
<tr>
<th>Table 1: Frequency data for Question G1.</th>
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<tbody>
<tr>
<td>Respondents mentioning theme (%)</td>
</tr>
<tr>
<td>1. Use of information/ Research</td>
</tr>
<tr>
<td>Access to information</td>
</tr>
</tbody>
</table>
Research and information management skills and tools 161
Presentation/publishing 145
Other information management 6

2. Enhances learning 71 408
   Skill development 134
   Expands range of teaching and learning tools 104
   Personalized/individualized/tailored learning 66
   Broadens and deepens knowledge and understanding 19
   General enhances learning 18
   Enriches learning experience 18
   Independent learning 15
   Integration of learning areas 12
   Efficiency/increased work output 8
   Enables practical use of learning 5
   Other specific learning enhancement 9

3. Motivation to learn 26 90

4. Connectedness/communication 25 104
   General connectedness/communication 42
   Social skills 24
   To other students, classrooms, teachers, schools, nations 19
   Connects them to the wider world, other cultures, broadens their minds 10
   Collaborative learning 5
   To state, national and international education projects 4

5. Constraints/concerns 15 75
   Reliability problems 13
   Availability, access - too few computers 11
   Neglect of other valuable teaching and learning tools and skills 11
   Teacher time/support 8
   Information overload - students waste time wading through, sorting out 7
   Other constraints 25

N = 331 respondents

**Enhances learning.** Skill development; the expansion of the range of teaching and learning tools; and the personalized/tailored learning that computers allow, were the main ways mentioned.

**Motivation.** Many respondents mentioned that children enjoy and are motivated by computers. A range of terms were coded under this theme including interesting, satisfying, pride, meaningful, exploring, attractive, stimulates, engaging, enthusiasm, willing, keen and rewarding.

**Connectedness/communication.** The largest sub-category within this theme was general (non-specific) mentions of “connectedness” or “communication” without further elaboration. Many mentions were made of student connections beyond the classroom to other students, classrooms, teachers, schools and internationally, and also to involvement in local, state, national and international projects of educational value.

**Constraints/concerns.** Fifteen percent of respondents to Question 1 mentioned a constraint or concern related to ICT use. The three main concerns mentioned with similar frequency were reliability of ICT facilities, limited availability and access to ICT facilities, and how too much focus or reliance on ICT led to neglect of other valuable teaching and learning tools and skills.

**Open-ended Question 2: How do you see computers affecting the future of classroom teaching?**

The main themes to emerge were, in order of frequency, as follows (see Table 2):

1. ICT learning will be a much bigger focus in the classroom
2. Constraints/concerns
3. Connectedness/ communication
4. Student centred learning
5. Change to teaching practice
6. Break down of formal school structures

Most respondents tended to answer the question in terms of the future nature of student learning rather than of teaching practice. Nevertheless, the largest theme arising from this question was that ICT will be a much bigger focus in the classroom of the future. Just under half of the respondents mentioned concerns or constraints related to future ICT use and about a quarter mentioned aspects of connectedness/ communication and a similar proportion aspects of student centred learning.

**ICT will be a much bigger focus in the classroom.** Most frequent mention was the increased use, role of, or reliance on ICT in classroom teaching and learning. In particular, mentions were made of more student work and learning being conducted on computers and on-line (produced, stored, presented and communicated) with less done in exercise books as students and teachers acquire their own computers.

**Constraints/ concerns.** Almost half of the respondents mentioned a concern or constraint. Comments appeared to reflect the current context rather than a better future. Resourcing was the main issue. In particular, respondents cited the limited number of computers available relative to the number of students in the class.

**Connectedness/communication.** Students and classrooms were expected to communicate and collaborate on projects more with other students/classrooms both within and outside the school from local through state, national and international levels.

**Student centred learning.** Many respondents answered the question in terms of student learning. This theme area was dominated by comments relating to the individualization of student learning, in terms of a greater ability to tailor tasks to individual student needs, greater control by students over their learning, and more independent learning.

<table>
<thead>
<tr>
<th>Table 2: Theme frequency data for Question G2</th>
</tr>
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<tbody>
<tr>
<td>Respondents mentioning theme (%)</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td><strong>1. ICT learning will be a much bigger focus in the classroom</strong></td>
</tr>
<tr>
<td>Increased use/ role/ reliance on in classroom teaching and learning</td>
</tr>
<tr>
<td>Greater range of teaching and learning options</td>
</tr>
<tr>
<td>An extra tool</td>
</tr>
<tr>
<td>Better integrated into and across the curriculum</td>
</tr>
<tr>
<td>Computer as teacher</td>
</tr>
<tr>
<td>Better content, technologies, programs</td>
</tr>
<tr>
<td>Other positive effect</td>
</tr>
<tr>
<td><strong>2. Constraints/ concerns</strong></td>
</tr>
<tr>
<td>Improvements required in ICT resourcing</td>
</tr>
<tr>
<td>Keep ICT in perspective</td>
</tr>
<tr>
<td>Other constraints</td>
</tr>
<tr>
<td><strong>3. Connectedness/ communication</strong></td>
</tr>
<tr>
<td>Students to other students, classrooms, teachers, schools, nations</td>
</tr>
<tr>
<td>To immediate and up-to-date information, national programs etc</td>
</tr>
<tr>
<td>Monitoring, tracking students progress and assessment improved</td>
</tr>
<tr>
<td>General connectedness/ communication</td>
</tr>
<tr>
<td>Home-school connections - more work done from home</td>
</tr>
<tr>
<td>Teacher-teacher communication, support and idea networks</td>
</tr>
<tr>
<td>Small and isolated schools have same opportunities, access</td>
</tr>
<tr>
<td><strong>4. Student centred learning</strong></td>
</tr>
<tr>
<td>Learning more tailored to individual needs/ student centred</td>
</tr>
<tr>
<td>Students control of what they learn/ more independent learning</td>
</tr>
<tr>
<td>Students will have a greater range and depth of knowledge (inc. ICT)</td>
</tr>
</tbody>
</table>
Better learning outcomes in other areas
Subject areas/learning will be more integrated - more project based
Students learn to be more critical/discriminating about information
Equity
Other learning implications

5. Change to teaching practice
Teachers required to manage, facilitate student use of ICT
Less actual teaching
Other change to teaching practice

6. Break down of formal school structures
Less one-size-fits-all teaching, greater flexibility, personalized
Other break down of formal school structures

N = 321 respondents

Change to teaching practice. Only a minority of respondents explicitly considered the affect of computer use on future teaching practice. Most respondents who did directly comment on future teaching practice expected that they would spend more time managing, facilitating and advising ICT based student learning activities.

Break down of formal school structures. A small number of respondents made comments about the role of ICT in breaking down current school structures in terms of changing teacher-student relationships with students increasingly becoming more knowledgeable in specialized areas (including ICT) than teachers.

In summary The open-ended questions highlighted the ICT awareness of teachers and their recognition of the need for more training to develop their own competence. It is ironic, therefore, that the data report a minimal time commitment of teachers to related professional development. One dimension that is not factored into these observations is the impact of compulsory curriculum requirements in primary schools for literacy and numeracy testing. It is likely that professional development priorities are more directly aligned with these current policy decisions. At the same time our project initiative helps inform state and federal governments of the likely next priority phase for testing.

Classroom Case Studies
At the time of writing, observations in classrooms are ongoing. Case studies involve the equivalent of one week in the classroom/school. Transcribed interview notes from eleven case studies to date are yet to be analysed and it is too soon to collate data for tables. However, some emerging themes shared below echo the issues raised by the teachers in the survey questionnaires. In particular in class observations, interviews of class teachers and other school staff indicate that in the early stages teachers experience considerable demands on their time and attention in order to be able to:

- Prepare for students to use ICT’s in the class programs, and to
- Manage the flow of classroom activity that includes the use is ICT.

The actual provision of ICTs in the classroom (or nearby), for example, two networked linked PCs (which appears to be the benchmark for classrooms), is likely to lead to withdrawal of students in order to access the computers. By comparison access to six PCs allows group work using ICTs to be organized in rotation with other class group tasks. Access to computer laboratories allows whole class activities. Hence, where the provision is proportional to the need for ICTs in the class activities it is possible for ICTs to be well integrated into the learning process.

One important finding emerging from interviews with children is evidence confirming the role of family and out of school influences on the development of their ICT skills (see Table
3. Students who use computers outside of school regularly report that the proportion is five to ten times the use of computers in class.

### Table 3: Where student use computers

<table>
<thead>
<tr>
<th>Student use of ICT</th>
<th>Year 3</th>
<th>Year 5</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>More at school</td>
<td>16</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>About the same</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>More elsewhere</td>
<td>34</td>
<td>30</td>
<td>64</td>
</tr>
<tr>
<td>Totals</td>
<td>52</td>
<td>45</td>
<td>97</td>
</tr>
</tbody>
</table>

Further evidence of the wider community of learners role is the indication of who is viewed by the children as their most important source of learning about ICTs (see Table 4). While

### Table 4: Source of students learning about computers

<table>
<thead>
<tr>
<th>Students learn from</th>
<th>Year 3</th>
<th>Year 5</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family adult</td>
<td>24</td>
<td>20</td>
<td>44</td>
</tr>
<tr>
<td>Older sibling</td>
<td>10</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Teacher</td>
<td>10</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>Friends or classmates</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Self</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>45</td>
<td>97</td>
</tr>
</tbody>
</table>

The incorporation of ICTs into class programs may provide powerful tools for both students and teachers but it also adds considerable complexity in terms of the necessary teaching and learning structures in the classroom in order to deal with the:

- Technology itself
- Students undertaking a complex set of activities within complex tasks.
- All happening within extended timeframes covering weeks rather than days (or even parts of days)
- Curriculum terms of reference that are less certain.

Confirming findings from other recent published views (Peck et al. 2002) these issues in turn lead to questions and new possibilities in relation to both curriculum and pedagogy, via, who chooses what, when and why? Offering conclusions at this stage is premature as much of the discussion to date is in the speculative phase. However, The final section of this paper explores what appears to be emerging as a model of teacher stages of readiness to move towards seamless integration of ICTs into teaching and learning arrangements.

**THE TEACHER AS MEDIATOR – PEDAGOGIES FOR ICT FUTURES**

Perhaps not since the advent of the print media has there been such a challenge for teachers. Like print, the broad societal take-up of ICTs means that learning is no longer bounded or controlled by textbooks or related sources of delimited knowledge. Teachers are and can no longer be the sole ‘experts’. Partnerships and linkages with non-traditional sources of knowledge are part of the new online ICT worlds. Learning is in a seamless place and space environment than can operate in multiple time and place contexts. The evidence gained to date suggests some clear challenges for teachers that make their role different from those poses by past changes. Now there is the need to consider external and ‘outside’ experiences, including the transient nature of knowledge, and the interdependence we now all have on skilled others (such as IT experts) to make the systems operate efficiently.
Our research has identified seven categories or degrees of engagement in teacher responses with ICT’s in general and online learning in particular. Similar to the Shield’s (2001) five levels of engagement with ICT these stages reflect a move from ‘novice’ to ‘expert’ user and better integration of the technologies into the learning process. Summarised in Table 4 they are part of a working theory for professional development whereby the teacher is encouraged to be reflective, work with students as partners in learning and engage in a process of action learning (Zuber-Skerrit, 1992) to apply questioning insight to existing knowledge.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Awareness</td>
<td>Acknowledgement but not real commitment of ICT and e-learning.</td>
</tr>
<tr>
<td>2. Information seeking</td>
<td>Conscious of the need for professional development. Still rather detached or ‘aloof’ perspective.</td>
</tr>
<tr>
<td>3. Personal trial and error</td>
<td>Making a personal commitment to embrace the new ICT’s.</td>
</tr>
<tr>
<td>4. Management decisions</td>
<td>Reflecting on the practical issues of integration the classroom including infrastructure, layout and learner behaviour.</td>
</tr>
<tr>
<td>5. Consequences for planning</td>
<td>Absorbing the challenges for “how I teach”.</td>
</tr>
<tr>
<td>6. Collaboration</td>
<td>Seeking to work with students, ICT support people, curriculum designers, parents and other stakeholders to bring about class based change.</td>
</tr>
<tr>
<td>7. Refocusing and integration</td>
<td>Arrival at the ‘expert’ stage of comfortable and relaxed integration of e-learning with mixed and fully online modes delivery.</td>
</tr>
</tbody>
</table>

At all stages in the process teachers need to be supported by their ‘expert’ colleagues. Having reached the stage of pedagogical refocusing there appears to be a corresponding shift in student involvement away from surface activities towards ‘deep’ learning for meaning and understanding (see Figure 2, Robertson, Fluck and Thomas, 2001).

**Figure 2: Student online learning levels of engagement (Robertson et al., 2001)**

**IDENTITY**
- Openness: Which might have some equivalence or relationship with perceived security and the degree to which one’s own identity is available to other.
- Anonymity: A measure of the learning taking place, and the degree to which students feel comfortable, empowered to learn and willing to participate.

**ENGAGEMENT**

CONCLUSION

Arguably, teachers using ICTs ‘best’ already model known best practice of good teaching. They know their subject matter well, are able to scaffold children’s learning and demonstrate excellent interpersonal skills. However, we are not convinced from our research that these dimensions can be used in traditional ways to identify authentic pedagogies for e-learning. Learning can be located for learners in multiple spaces. This assumption applies equally well to teacher and student learners. Taken to its conclusion the flexibility of ICTs and e-learning
being possible in any place and time could see a future where teacher and learner are no longer located in the same physical space. Nor does this signal a return to the ways of past distance learning. New interactive partnerships are called for where learners construct knowledge and teachers mediate for valid and reliable outcomes that will best serve their mutual needs and those of future communities.

REFERENCES


