Teachers' perceptions of online modules to promote professional learning of ICT

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Abstract: Online professional learning has the potential to be a cost effective, flexible approach that can reach large numbers of teachers. However, there are many factors that need to be evaluated in developing successful online approaches that impact on teaching pedagogy and student learning. This paper outlines one phase of a research study conducted on behalf of an Australian state-based Department of Education to evaluate the transfer of professional learning from online modules about the integration of ICT to the practices of K-12 classroom teachers.

Transfer of teachers' professional learning to the classroom

> In a sense, any learning requires a modicum of transfer. To say that learning has occurred means that the person can display that learning later. (Perkins & Salomon, 1992)

It is on such a belief of transfer that much teacher professional learning (PL) is based. There are now growing numbers of online teacher PL programs that are offered on the internet, which provide ready access to courses and programs for teachers wishing to upgrade their skills in a range of areas. They are based on the assumption that learning gained through studying these programs will later transfer to their teaching practice and subsequently lead to better outcomes for teachers and students. This paper reports on one phase of an evaluation of such a professional learning program.

Recent developments in pedagogical research and theory have changed the way transfer is seen. Grabinger (1996) contended that the assumption that people transfer learning easily by learning abstract and decontextualised concepts, has been generally replaced, under the influence of more constructivist approaches, with the assumption that people transfer learning with difficulty, 'needing both content and context' (p. 667). For example, Boud & Walker, (1990) emphasise the importance of a context that enables teachers to reflect on their new experiences; Lave and Wenger (1991) argue for a context in which the learning takes place to be similar to that in which the new learning will be applied; Broudy (1977) proposed that transfer needs to be considered beyond the contexts of 'knowing that' (replicative knowledge) and 'knowing how' (applicative knowledge) to also 'knowing with', such as, knowing how to teach intended learning outcomes with the use of technology.

This notion of 'knowing with' is one that resonates well with learning with technology. Perkins and Salomon (1992) have also noted: 'Whether transfer occurs is too bald a question … One needs to ask under what conditions transfer appears' (p. 6). These conditions can include such factors as the teachers themselves, the time taken to learn new skills, the socio-cultural environments of the training and workplace, as well as the program design (Leberman, McDonald, & Doyle, 2006). The conditions for transfer of learning of educational applications of ICT were explored in a study of online modules designed for teachers in K-12 classrooms, and the findings are described in this paper.

Background to the professional learning program

One hundred and seventy teachers throughout 85 schools in one state of Australia, participated in a pilot implementation of professional learning using online modules designed to integrate technology into teaching and learning. The project focused on supporting K-12 teachers to increase their skills in using an information technology application, which they could then integrate into their teaching practice. Through a range of two-hour modules, delivered online, teachers were provided with: step by step instructions on an ICT application (such as Microsoft PowerPoint, iMovie, Excel, etc.), teaching and learning samples from a specific learning area and level, an online facilitator, teacher relief and project officer support. The teachers completed the following activities as part of the professional learning program. The teachers:

- completed an online, self-paced module (approximately 2 hours)
- designed and taught a sequence of lessons integrating an aspect of ICT into their teaching and learning practice
- refined the sequence of lessons after teaching
- submitted the sequence of lessons to the project manager
- submitted three student work samples generated from the lessons
- evaluated the module, using a template provided online, and completed a written evaluation form.

The research study

In 2005, the authors, on behalf of the Department of Education and Training, undertook an evaluation of the transfer of this professional learning to teachers' classrooms. This research study was concerned with the conditions under which learning transfers from ICT-based modules to classroom practice and addressed the following questions:

- What are the challenges and consequences for teachers when they transfer professional learning into practice?
- What are the conditions that support teachers to expand the use of ICT in their teaching and professional learning?
- What is the impact of teacher professional learning on student ICT experiences?

Methodology

The research employed a telephone survey and a multiple case study approach to investigate the impact and transfer of knowledge of teachers who participated in the online modules program. The study sought to establish the critical factors for teacher engagement and success in integrating ICT-based practice. Thirty six of the 170 teachers were targeted to participate in the study.

Phase 1: *Interviews with participants:* A representative number of teachers was targeted for interview to sample all 18 ICT modules (2 teachers for each) selecting a total of 36 teachers for interview across subject areas, school types and locations. Telephone interviews were conducted, using non-scheduled standardised interviews with the teachers covering: development of work programs subsequent to PL completion, implementation of lessons, outcomes, challenges encountered, impact on students, and willingness to improve. Interviews were taped via speaker phone to a digital recording device. Digital voice recordings were then transcribed into a word processing document for analysis. It is this phase of the study that is reported here.

Phase 2: *Selection of in-depth cases:* Of the 36 teachers who agreed to be interviewed, thirty indicated their willingness to be involved in the follow up case studies. Of these, a purposive sample of eight teachers was chosen to participate in the more in-depth enquiry. This phase of the study is reported in Herrington, Herrington, Hoban and Reid (2006).

Analysis of data
Qualitative analysis of the interviews was conducted using the constant comparison method (Merriam, 1998) of determining major themes and issues. Data was further considered within the framework suggested by Miles and Huberman (1994) of the three stages: data reduction, data display and conclusion drawing and verification. Draft versions of data analysis were considered at several meetings of the research team to consolidate the findings and verify that the analysis and report did not misrepresent the views of any individual researcher. Themes and issues identified in the interview and case study data have been discussed below.

Findings for Research Question 1: *What are the challenges and consequences for teachers when they transfer professional learning into practice?*

The transfer of learning within a professional learning context is not necessarily a simple matter of taking what is learnt about a technology application in an online module and implementing it in a classroom context. In the pilot implementation of the online modules, a complex range of factors were revealed in the research that impacted on teachers' readiness and willingness to effect change in their approach to using technology for student learning. Each of these factors is explored in more depth below.

Usefulness of modules in preparing teachers to integrate ICTs
The quality and usefulness of the online modules themselves was an issue that affected teachers' preparedness to implement appropriate strategies within their teaching programs. Both the benefits of the online approach, and the difficulties, emerged in the interviews with teachers. The major issues appeared to be that the modules, when they were well-designed, assisted greatly in providing teachers with new ideas and skills, but at times there were problems and difficulties associated with this form of professional learning.

Learning new ideas for effective use of technology
Many teachers valued the ideas they gained for integrating technology more fully into their classrooms and overall teaching approaches. One teacher described her enthusiasm to engage with an appropriate online module in an effort to learn strategies for encouraging students to use the web in creative and responsible ways:

> We [wanted] to get students thinking more about selecting and actually querying the information that they're given … so that they can make value judgements about reliability of what they're dealing with.

Learning new skills
Learning new skills was also a significant positive outcome of the professional learning, and one that resulted in a great deal of personal satisfaction from the teachers, in terms of their own learning and skill development. One teacher expressed the belief that he felt more prepared, compared to other teachers he knew, to implement the

technology usefully in the classroom. Another teacher was pleased with his own professional learning from the module when he learned a new piece of software:

> We worked with Microsoft Works, which I really haven't worked with before, and I think it helped because we're trying to use the database and we're actually building it into an assessment task for one of our subjects, so it worked really well.

Problems or difficulties with the online modules
A few of the teachers found the online modules difficult to access for a range of reasons, and it appears that many simply gave up. Many found the professional learning not very helpful, or worse, a waste of time. For example, when questioned about how the modules helped teachers in their own learning or their use of the technology in their classes, there were a few comments like:

> It didn't help at all.
> I don't think it gave us any further skills … it hasn't enhanced [my teaching] one little bit.

Another teacher expressed disappointment with the lesson plans provided to implement the use of the technology with a class. The teacher appeared to see the plans as fairly restrictive and linear, and had himself thought of more innovative, authentic means to use the technology:

> It became evident that doing just a short series I think of three lessons really does not prepare the kids … instead of doing iMovie as a short sequence of lessons, I'd be looking at doing it as a complete topic within technology and taking a timeframe of around about a term.

Problems implementing learning from the modules
In some instances, teachers felt positive about the professional learning experience and learned much from the online module, but were discouraged from implementing the strategies because of restrictions in their own classroom or school context.

Availability of technology: Hardware and software
The lack of access to reliable computers and other technology appears to be a major problem for many teachers wishing to implement learning from the online modules. For example, one teacher, who was very positive about her own learning from the online module, and saw the value in using the technology as a powerful tool in the classroom, was constrained by the availability of computers in her school:

> The library is used by everybody and anybody, [the network] is often down, sometimes there are other things happening and sometimes you just can't even get a booking.

Other teachers pointed out similar difficulties in accessing computers when they needed them for their classes, particularly in terms of competing with other classes to access over-booked computer labs. Software problems were also reported by many teachers, often involving the installation and availability of the software that was explored in the online modules. Many teachers were keen to use strategies learnt in the modules with classes, and when it involved a particular piece of software, it was often a challenge to obtain it for the school computers. For example, one teacher had difficulty ensuring that all computers had database software, nominating it as one of the real challenges in implementing new strategies. Another teacher described the nature of her problem downloading relevant software:

> I found that my dial up network at home was too slow to use it. It was going to take me 27 hours to download the program and I just went, no you're kidding.

Reliability of technology
In those cases where availability and supply of hardware and software was adequate, the reliability of the technology (or lack of it) often caused problems. One teacher described at length how frustrating the experience of trying to implement the technology-based approach he had learnt in an online module. He faced difficulties loading software, learning how to use it, obtaining access to relevant data, and then finding that what he had was not really

appropriate for the class he was teaching. However, in spite of these difficulties he did come away from the experience with important knowledge on using technology in the classroom:

> It raised awareness of some of the issues that you had to face in planning and implementing. It made me aware that they were there.

Lack of time
Lack of time was often cited as an impediment to teachers' own learning about, and use of technology in the classroom. While a school may provide verbal support for innovation, in many cases this support is not carried through by providing the time and resources to make it a reality in the classroom. For example, one teacher pointed out that while there was notional support within her school for more effective teaching and learning strategies, it was expected that such professional learning and preparation should be done in the teacher's own time. Teachers in the study appeared to be acutely aware of maximising PL time to best advantage.

Inadequate student computer literacy and competence
One difficulty mentioned by a few teachers was the varied levels of student computer literacy that can be found within a class. While there can be an expectation that most students today are very computer literate, this is not necessarily the case. Variations, from very competent self-directed users, to novices can cause delays in teachers being able to implement their planned approach. One teacher described the problems he encountered in this regard:

> The first [problem] was the varied level of computer literacy within the students. I realised that I needed to go back to very basic instruction, so that was a learning experience for me. I had assumed knowledge about the competence of the students and that was a false assumption.

Whether the modules facilitated pedagogical changes
One of the most meaningful consequences of a teacher's involvement in the professional learning would be the extent to which the completion of an online module facilitated pedagogical change in the teacher's approach. An exploration of this issue with teachers revealed that pedagogical change did occur for many, and the means by which this happened are described below.

By teaching teachers new content and strategies
A few teachers described the professional enhancement and enjoyment they derived from adding new teaching skills and strategies to their pedagogical approaches. For example, one teacher described how his greater knowledge of spreadsheets has not only added to his own knowledge, but also changed his approach to teaching in some ways:

> I'm integrating spreadsheets into Year 9 science so it's changed it [his teaching]. It's given me an extra methodology. I use spreadsheets which I didn't before, didn't use them at all.

Even when teachers had knowledge of a particular technology or piece of software, some described how the online module helped to extend and diversify their knowledge and pedagogy in new ways. For example:

> The kids were already doing digital portfolios at the end of the year, I think we've done them for about 3 years … [After the online module], instead of just photos, we were putting copies of their work and scanning their artwork into it. They were recording their own spelling results each week, and they made up a graph, so we inserted that into their digital portfolio.

By stimulating teachers' own learning
Some teachers acknowledged that the online PL impacted on their approaches to teaching health across the board. One teacher, who had previously expressed dissatisfaction with the content of the module she had completed, admitted to learning a lot about questioning, an important but unintended outcome of the module:

> [My colleague] and I … reviewed the lessons we had taught and we decided to refine our questioning to make the children think more critically, and to me that was the big benefit of the module, having the time to think about our questioning techniques … My questioning has become a lot more in depth, so the children to me are more engaged

because the activities and the questioning are more well thought out. I think the quality of work of some of the children has improved and the children's critical literacy skills are improving … because of the questioning technique that we've adopted.

Other teachers also indicated that their teaching strategies had changed to incorporate more technology in meaningful ways.

Findings for Research Question 2: *What are the conditions that support teachers to expand the use of ICT in their teaching and professional learning*

An important factor in the transfer of learning from the modules into classroom practice was the teacher's overall approach to the experience of completing an online module. When the experience was an extremely positive one, facilitating student learning with the relevant technology seemed to follow easily, through the enthusiasm and determination of the teacher to achieve it. However, there were several other critically important aspects of implementation that supported this transition, largely within the teacher's school environment itself.

Positive response to undertaking the modules
The reasons for teachers undertaking the modules seems to have impacted on the extent to which they immersed themselves in the experience, their later use of the learning in their teaching, and the ultimate worth they placed on the professional learning experienced. Those teachers who had a good reason for completing the modules were generally more positive as a whole to the professional learning, and seemed to have fewer difficulties implementing technology-based strategies.

Learning new approaches and strategies
One important reason for undertaking the professional learning was to learn new ways of motivating and encouraging students in their use of ICT. For example, one teacher's reason for taking the online module course was to explore new ways to deal with students' widespread use of the internet to download chunks of information without critically questioning the quality.

Learning new ways to incorporate technology
A physical education teacher expressed an interest in trying to incorporate more technology into the subject as he felt that, to date, technology was under-used in the subject area at his school. Other teachers also commented in a similar vein:

> It was definitely just an introduction for me but it got me on the right track. The work I was involved with was word processing, database and spreadsheet type work so I hadn't actually done anything in the creative arts area so it … broadened my horizons.

Factors that supported implementation in schools
Within the school environment itself, several factors emerged as critical to teachers' views of how successful the online modules were in changing their professional practice.

Provision of additional time
Just as lack of time was an impediment to the implementation of learning from the online modules, the provision of time was a critically important factor for teachers in its success. Three professional learning release days were invaluable for teachers in coming to grips with subjects which often required sustained effort and concentration to master. For example:

> We were provided with day release, a couple of days to write our lesson or go through the PD, write out a lesson sequence and then to test that on our class … so that was very good.

Support of others in the school community

Two teachers within a school generally completed the online modules at the same time. This proved to be a valuable strategy in providing inbuilt support and collaborative opportunities for the teachers. Many teachers commented on the value of this 'professional dialogue':

> For me, it was the other person doing the same work at the same time and sitting beside me … every time I messed up I was able to say: 'Help, how do I fix this?' If I hadn't had someone supporting me here I think I would have found it much more difficult … just having someone to do some networking with and brainstorm ideas. … So I think that professional dialogue seemed really critical to the whole thing.

The support of designated (often by reputation) ICT proficient teachers or non-teaching support personnel was also appreciated by teachers in their efforts to fully apply their learning from the modules. For example:

> We've got the real guru, he's the ICT man. He's not only got expertise, but he's got a passion … he's the bloke that I go to see [with questions] because he answers them quickly.

The support and encouragement of the principal or head teacher in a learning area was an important factor that supported implementation of ICT in schools. One teacher described the support given by his head teacher, not only in allowing time but also by providing hands on assistance in learning the software. Although not a major influence, one or two teachers mentioned how helpful the support of parents was in implementing technology-based initiatives with students. For example, one teacher in a fairly small school pointed out:

> I've got a really supportive parent body who, any time I mention technology are only too happy to go buy things for me. They've bought the digital camera and the data projector and they bought a whole lot of other stuff this year … having them on board's been really good.

Culture of the school
Whether or not the teacher's school instantiates a technology-rich or technology-friendly culture appears to be another important support factor in whether or not a teacher's learning from the modules transfers to classroom practice. Such a culture is often reflected in a critical mass of knowledgeable and supportive peers who might have used similar strategies in their classes, and in technical support that might be available from a range of sources:

> The school is a very strong technology school so we've got a whole lot of other teachers around the place who have used [the software] in a number of different ways. And then of course we've got technical support people as well who can come into the class and assist.

Collective knowledge about what it takes for technology-based innovation to work (at both the pedagogical and practical levels) is often seen as a characteristic of supportive school culture.

Findings for Research Question 3: *What is the impact of teacher professional learning on student ICT experiences?*

The data collected in the study indicates that teacher professional learning through the online modules impacted substantially, not only on students, but also on the wider school communities, often in unexpected ways.

Benefits for students
Students learning with powerful and engaging technologies were the most profoundly affected group, in terms of learning from the online modules, beyond the teachers themselves. The teachers' knowledge of technologies and appropriate strategies filtered through to impact on students in several key ways.

Students engage in authentic and meaningful learning experiences
Perhaps the most significant effect for some teachers and their students was the use of the 'affordances' of technology to create more meaningful and authentic learning tasks. For example, one history teacher described in detail how the learning from the PL affected a real benefit for students in the tasks she set for her class:

Instead of just pressing the [paste] button and giving me facts, which anyone can do, they had to put it into a newspaper format of the time. So they were talking about women going on strike, and demanding their say in education, and [the students were] taking an angle. By sorting out their questions, it was forcing them to actually take an angle.

A physical education teacher described a very practical outcome for students, in addition to the general benefits of using technology, through the production of an online first aid manual students and their families can subsequently use at home:

They do a first aid journal. We usually do it just on paper but now we use computers so they can find the information and research it, and then it's actually on the computer for them. They can take it home and have a copy of the first aid manual so they can use it at home.

One teacher described in detail how he planned to engage students with video editing software (learned in the online PL) through the use of a realistic video production exercise that related to their own curriculum areas:

The design brief was that they needed to compile a segment for a lifestyle TV program. So those students who were in either the woodworking or metalworking areas, they were doing [a segment] along the lines of a DIY, and students who were in the food or textiles technology areas were doing more of a lifestyle kind of thing.

Learning generic lifelong learning skills, beyond those explicitly taught, was a very real benefit for students, as one teacher explained:

What we're seeking to do there is to address some of the non-technical outcomes … getting them to do some teamwork, and they need to do some of the documentation, taking minutes for meetings, and assigning tasks for each other, and … introducing the kids to the concepts of working as a team.

Students take greater control of their learning

Using technology to create portfolios proved, in the view of one teacher, to engage students more and facilitate higher order thinking in the preparation of their work:

They're more engaged as learners because they can see more results of the learning process, they are taking greater control of their own individual learning … There's a lot of decision making that the children do as to what goes into their portfolios now, and they're operating at a higher level with their thinking.

Students respond well to technology

Several teachers felt that students benefited a great deal from their increased knowledge of technology, and its use in the classroom, as young people are more familiar with many forms of technology and have readily embraced it in their day-to-day lives. For example, one teacher made the point that:

If you use technology you are in their medium. If you use computer technology particularly you are working at something that they like, that engages them because it's immediate.

Students use technology to express themselves

Especially with language learners or very young children, although not exclusively, technology can help students to express their ideas when their verbal and vocabulary skills are still developing or inadequate. For example one teacher described how her students used PowerPoint:

They really seemed to enjoy the activity because they could put their own personalities into it, but it's still very language-focused. It's very hard to find things that are really interesting that they can do with the little language they have, and I think they really enjoyed being able to use pictures and use the different decorative effects that PowerPoint has to express their personality when they were talking about themselves.

Or as this teacher pointed out, students use technology to express themselves in ways that amaze their teachers:

I basically tried to help the kids become more familiar with it, then they take off with it. You show them one bit of it and they come back and have taken it somewhere else and developed it. Oh yes, they were gone with it. They run with it quite readily. It is amazing what they come back with - ideas you never even thought of.

Transfer of modules across curriculum areas or years

Regrettably, the use of ideas and strategies from the modules were frequently confined to the subject areas and stages that were part of the learning experience for many teachers. However, not all teachers were constrained by the original context of the learning within the modules, and used their imaginations to find new ways to use their new technology skills across the curriculum and year levels. One history teacher said that she adapted ideas learned in the online module for her Years 7, 8 and 9 history classes, with subsequent benefits for students. She described the results of one activity:

> I adapted that Year 8 [activity] to Year 7, and while it was hard work and it took them a while to actually get the idea, I think they came up with far better product as a result of it.

Because many of the teachers in the study were specialist secondary teachers, many did not have the opportunity to apply their technology-related learning across different learning areas. Nevertheless, where possible within the constraints of their own teaching profiles, teachers used the ideas across subject areas, especially primary teachers. One teacher was so excited about the potential learning experiences and engagement that the Robotics topic offered, that he and his colleague (who had also studied the PL module at the same time) intended to start a robotics club for students and staff at the school:

> I'd like to do it again with my class this year … I prefer to integrate it into the general classroom where you can make the links with other things, but there has been so much interest that we are starting a robotics club as well.

Benefits for educational community

Sharing learning and resources within a school, district or learning area community was a very positive outcome of the professional learning. One teacher used the PL lessons while a preservice teacher was on practicum in her classroom, and in so doing, provided further valuable professional learning beyond her own experience. Another teacher described how the work she had done as a result of the online mo dule was starting to impact on the whole lower school language program, and further, through her own presentation of the module content to other teachers:

> We sat down as a Faculty at Staff Development Day at the beginning of this term to discuss extending that activity so that it's a whole new group activity across the two language [areas].

A beginning teacher who used a totally different piece of software with students, which he felt few teachers in his school were familiar with, intended to conduct professional learning sessions within his school

Conclusion

In determining the challenges and issues associated with the use and dissemination of learning within the professional learning program, a range of factors impacted on teachers' experience. Factors such as the quality of the online modules themselves and how well they were supported, problems associated with implementing new technology-based pedagogy in the classroom, and whether the modules facilitated pedagogical change were all issues that affected the extent of impact of teachers' professional learning on classroom practice.

An exploration of the kinds of factors that supported teachers' expansion of use of ICT in the classroom and factors that impeded it, revealed a range of critical factors both within the design of the professional learning itself and in the teacher's school environment. A positive response to the professional learning generally saw a positive result in the school largely because of a teacher's determination to implement the ICT. Possibly the single most important factor in successful implementation of PL modules appeared to be the provision of three teaching release days which enabled teachers to fully prepare and integrate their learning into their teaching programs. However, other general factors and constraints within a school could either support the changes or make the implementation of ICT impossibly difficult.

While for some teachers the professional learning was frustrating, time-wasting and ineffectual, when teachers' experiences were positive and valuable, the impact on student ICT experiences was profound. The benefits for students were numerous, through their own enhanced learning strategies, their increased knowledge of ICT, and their powerful use of technology to express themselves when other means may have failed them. The transfer of knowledge, when it happened, was not constrained to the walls of a single classroom but went beyond to other subject areas, other levels, with and beyond the school community.

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