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Transfer of online professional learning to teachers' classroom practice: An analysis of eight cases

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Abstract: Professional learning is an important process in enabling teachers to update their pedagogical knowledge and practices. The use of online technologies to support professional learning has a number of benefits in terms of flexibility and scalability. However, it is not clear how well the approach impacts on teachers' classroom practices. This paper outlines a research study conducted on behalf of a 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 online learning to the classroom

The application of knowledge learned within an instructional environment is of paramount importance to any educational or training system wishing to effect change. Indeed, all that teachers do is based on a firm belief in transfer. As Bransford and Schwartz (1999) put it: 'A belief in transfer lies at the heart of our educational system' (p. 61).

Recent developments in pedagogical research and theory have changed the way transfer is seen. For example, 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). 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). The conditions under which learning transfers from ICT-based modules to classroom practice was the focus of the evaluative study described in this paper.

In 2004, 170 teachers, involving 85 schools, in a state-based educational system 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 two-hour modules, delivered online, teachers were provided with: step by step instructions on an ICT application, teaching and learning samples from a specific *Key Learning Area* and *Stage*, an online facilitator, teacher relief and project officer support. Teachers involved in the program in 2004 completed the following activities as part of the professional learning program. Specifically, the teachers:

- completed an online, self-paced module (approximately 2 hours)
- designed a sequence of lessons integrating an aspect of ICT into their teaching and learning practice
- taught the sequence of lessons
- 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 the template provided online, and
- completed a written evaluation form.

In evaluating the effectiveness of this program in facilitating transfer to classroom practice, the research 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, and were interviewed using non-scheduled standardised interviews: development of work programs subsequent to module completion, implementation of lessons, outcomes, challenges encountered, impact on students, and willingness to improve. Of the 36 teachers who were 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 based on willingness to be involved and the recommendation of the researcher who interviewed the teachers of those most likely to offer quality in-depth data. The teachers were nominated based on the (self reported) extent to which the knowledge they learned in completing the modules transferred to their classrooms and for their willingness and ability to articulate their successes, problems, issues and accomplishments. The cases also needed to represent primary and secondary school systems, and regional and metropolitan schools. This paper reports on the case study findings undertaken in the second phase of the study.

Eight cases were researched for in-depth examination of factors and conditions associated with transfer of learning from online modules. The eight cases comprised: Three metropolitan comprehensive high schools, one regional comprehensive high school, one regional selective high school, one rural primary school and two regional primary schools. Two researchers from the team visited four schools each, for one day, to collect data for the in-depth case studies that involved:

1. *Teacher and class observation:* With permission, the researcher visited the teacher's classroom, and observed and documented the context of the implementation of the ICT skills learned in the online modules. The researcher made note of pedagogical strategies manifest in the ICT modules, and observed the nature and extent of transfer to teaching practice. Notes were collected for analysis.
2. *Teacher interviews:* A non-scheduled standardised interview was conducted face-to-face with each teacher. Each interview lasted approximately 30-40 minutes, and was recorded on a digital recording device or cassette tape recorder for transcription.
3. *Student interviews:* At each site, the researcher interviewed a small group of 2-3 students in each class to obtain student perspectives on the use of the ICT teaching approaches. Each interview lasted approximately 10-20 minutes, and was recorded on a digital recording device or cassette tape recorder for transcription.
4. *Additional artefacts:* Lesson plans and student work samples from the observed classes were collected to provide further corroboration of findings.

Case study findings

Each case study school was visited by a member of the research team for one day. During the visit, discussions were held with the teacher prior to the observation of the teacher's class. After observation of the class, two interviews were conducted, one with the teacher and the other with a group of students from the class.

Analysis of transfer to teaching practice

Six aspects of transfer were explored, together with an investigation of an implementation of the technology-based strategies in the teacher's classroom.

1. *Initial learning occurred*

    It has been argued that transfer of knowledge is facilitated if it is well learned to begin with, a process that Prawat (1992) claimed is best done 'by building connections—both of the knowledge-knowledge and of the knowledge-context variety. The richness of connections between elements of knowledge ... directly affects the accessibility of any aspect of knowledge in a novel situation' (p. 381). The first stage in investigating transfer was to try to determine how well teachers had learned a particular ICT approach within the online modules professional development program. Questions in the interview explored how well teachers learned the subject of the package, whether connections were made, whether teachers monitored their learning and reflected, and whether they could speak knowledgably about the subject or they would have to go back to their notes.

2. *Transfer of the subject of the learning module*

    The second indicator of transfer explored was whether the subject of the learning module transferred to other contexts, that is, the same technology strategy taught to a different year level or curriculum area. For example, if the teacher did an online module on *PowerPoint*, was the knowledge of that package used again, with the same subject matter with different classes, or different subjects areas than the original class?

3. *Transfer to the ready use of other software packages*

    The third indicator of transfer was whether teachers' learning in the module subsequently extended to the use of other software packages or programs. For example, if a teacher completed an online module on *PowerPoint*, has he or she readily used other software like *Inspiration, Excel,* or *iMovie*?

4. *Transfer to the use of other technologies*

    Fourthly, transfer to other types of technology was explored with teachers. For example, if a teacher completed an online module on a computer-based application, like *PowerPoint*, has it inspired him or her to use other types of technology with students, such as making movies, showing video, using palm pilots, or audio taping.

5. *Transfer of pedagogical approach*

The fifth type of transfer explored was transfer of a pedagogical approach from the technology context to any other (not necessarily technology-based) context. For example, did completion of an online module encourage a teacher to think about different pedagogical approaches that might be applicable elsewhere, such as designing and presenting assignments as in *Webquests* (tasks, process, resources), or using headings to organise a document as in outline view in *PowerPoint*?

6. *Transfer as 'preparation for future learning'*

The final type of transfer investigated was perhaps the most nebulous, but potentially most significant, as it investigated whether the experience of completing the online module prepared a teacher for future learning. For example, if a teacher completed an online module, whether it has helped to change his or her attitudes to technology generally, whether he or she might no longer be afraid to try technology applications with classes, or whether he or she is now prepared to take on new challenges with technology.

Finally, teachers were asked to describe a real example of their use of technology in their teaching. It was thought that asking a teacher to project to a real case might help to gain further insight into the practical aspects, advantages and disadvantages of using technology in their classes. They were also asked to nominate the kinds of professional development they now considered appropriate and necessary for their further development in the pedagogical use of ICT.

Teachers' responses were summarised for display (Miles & Huberman, 1994) including, where appropriate, a short quote. A rating was given for each teacher on each of the dimensions of transfer, where a judgement was made as to the impact of the online modules in affecting change, that is as *high, moderate* or *low* impact. Finally the cases themselves were placed on a relative continuum of *high* to *low* impact. This analysis can be seen in Table 1.

Snapshot of a high impact PD context

Case Study 4 appeared to gain the most benefit from the online module professional development. Although admitting to 'always enjoying using computers' this teacher had little prior knowledge of the subject knowledge of the module. Getting time to practice what was learnt was viewed positively. The teacher had a number of thoughts and experiences about how to extend what was learnt, how to apply it in other year levels and how to enthuse other staff to use it. On the other hand, the modules appeared to have less of an impact on the pedagogical approach used by the teacher. The student activities generated from the module essentially involved low level skills with students retrieving information in order to complete a worksheet.

From this case—although itself not a perfect instance—it is possible to propose the characteristics that might maximise the potential of a high impact professional development experience within the context of the online modules.

Successful professional learning of ICT applications in classrooms is facilitated by, and most likely to occur, when:
- Accurate and descriptive information about the professional development program, its purpose, methods and requirements, is available to potential participants
- Well-designed online modules are offered that are regularly updated and evaluated
- Sufficient time release is given for learning and evaluating the module, for planning lessons, and reflecting on learning
- Professional development support is provided by expert online facilitators
- Mentoring support is provided by the school principal and other senior teachers
- Peer support is provided by another teacher in the school completing the module at the same time
- Technical support is provided by IT-knowledgeable support or teaching staff
- Ready access is available to appropriate and reliable software and hardware, and to facilities within the school
- A collegial and supportive school culture exists that encourages innovation and growth, and provides the means to share knowledge at a school level.

This research study indicates that in such an environment, the professional development experience of the online modules would have the greatest chance of success in impacting on the use of ICT in the classroom.

Snapshot of a low impact PD context

Case Study 8 appeared to gain little from the online module experience as the knowledge was not new. As the teacher indicated 'it was a good module if you had no idea about Power Point presentations, about importing digital images, about making iMovies, but we'd done all of that sort of stuff.' In the teacher's view the content was not suited to school realities 'the examples were fine but not the timeframe.' The intention of the module was not clear: ' It was really wishy washy and we thought that the online module would tell us exactly what it was that we had to do for this project, but we were still unclear.'

Apart from some of the concerns with the module and its suitability, the impact was low because this teacher already had a well-developed knowledge of technology and software applications, which were being used effectively with students. This highlights the importance of informing prospective participants about the nature of the module and its intended outcomes.

Table 1: Transfer of teachers' knowledge to teaching practice

		Learning/ knowledge of technology	Transfer of subject knowledge	Transfer to other software	Transfer to other technologies	Transfer of pedagogical approach	Transfer as preparation for future learning
High impact	Case 4	? ? ? Very little previous knowledge, learned much from the module *'It was new to me … yes, I feel quite confident now'*	? ? ? Used with Years 7 and 10, and would with other stages and subjects in future *'It could be used in history … and economics'*	? ? ? Yes, and keen to teach other teachers the software of the module *'I'd like to teach the rest of my faculty how to use it'*	? ? Yes, interested to use different technologies but not sure whether because of the PD *'I don't know, it was just an idea I thought I'd try'*	? Very positive generally but could not define any strategies that transfer *'I suppose it's given me more confidence'*	? ? Already positive and enthusiastic to use technology *'It consolidated what I was doing … made me feel I was on the right track'*
	Case 6	? Teacher had knowledge of software *'The module made me broaden my horizons'*	? ? ? Yes, across K-6, and all KLAs *'I spent the holidays planning the K-6 technology program and that was a direct result of doing the module'*	? Yes, but not as a result of the module *'I'd have to say no because I already use a range of software. That aspect hasn't changed at all'*	? ? ? Yes, generally, such as movies to insert into PowerPoint etc *'I do actively now try and incorporate a huge range of technology'*	? ? Yes, to an extent in planning of lessons *'It's made me look at a truly integrated approach of technology within our curriculum'*	? ? ? Yes, the module seems to have had a huge impact of outlook and confidence *'It got me out of the old routines to start looking further afield'*
	Case 3	? Teacher had prior knowledge *'I was au-fait with their usage'*	? ? ? Used with Years 9 & 10, and later with Year 12 *'If I was going to use it with Year 12 again I'd make it harder'*	? ? ? Yes, would use other software like databases on certain topics *'The solar system lends itself to getting kids to make a database'*	? ? Yes, to a certain extent, but already using a lot of technology	? Confirmed approaches already known to work	? Teacher already competent and enthusiastic about technology *'I was never afraid of computers'*
	Case 2	? Teacher already had knowledge prior to PD *'I modified what was in the module and did it myself'*	? ? ? Has used with other classes, and plans to do more *'It will possibly be more of a faculty thing … let's see how we can put it all together'*	? ? Yes, enthusiasm to use different software in class *'The more courses I do the more confident I get'*	? Yes, but not related to modules *'I'm teaching myself as I go. I've always been interested but I wasn't very confident'*	? Teacher did not use the approach recommended in the module *'I tailored what I learned to direct the students'*	? ? ? Very positive and open to ICT *'What I've learned as I use more technology is that often I can work the answer out without having to ask'*
	Case 1	? ? No previous knowledge of software; learned much but not expert *'I'm at a point where if I wanted to explore further I could'*	? ? Used with two groups but at the same level *'It was too complicated to arrange and my head teacher didn't know if it was worthwhile'*	? Minimal transfer *'The module I did didn't do any more for me from that point of view because it was specifically on [the software]'*	? Yes, but not as a result of the module *'I think the interest was already there, full stop. It's mainly been generated by being at a school'*	? ? Some transfer of strategies to other teaching *'It's a way of teaching mapping and landforms'*	? ? ? Open to new learning *'It's important that you've got the opportunity to do PD. Otherwise you become staid - there's no enthusiasm to move on'*
	Case 5	? Teacher had prior knowledge of the technology, but learned much more about pedagogy	? ? Not yet, but planning to implement across the whole Year 8 TAS curriculum *'We were planning what to do at our last staff development day'*	? Yes, but not as a result of the module *'I have a passion for technology … it's just something I would have done anyway'*	? Yes, but not as a result of the module	? ? ? Teacher not sure, probably not *'From a teaching sense I got a huge amount out of it'*	? ? Teacher already positive and open to using technology *'From my perspective [completing the module] was good reinforcement'*
Low impact	Case 7	? Teacher had prior knowledge of software Practised program and found new ways to use it *'I feel like an expert'*	? ? Yes, used with K & Year 1 Intends to use with other stages in future *'Something like this would be good for older kids as well'*	? ? Yes, Microsoft Word, ABC website, Bananas in Pyjamas *'We've mainly focussed on Microsoft Paint and the digital camera'*	? No other technologies used *'Maybe towards the end of the year we can make a video, but I think that would be a bit hard'*	? No pedagogical approaches from module appear to influence other teaching *'We just did what we thought we were supposed to do'*	? ? Appears open to new challenges *'I've always liked technology … [but the PD] has made me more confident'*

		?	?	?	?	?	?
	Case 8	The PD experience was not positive for this teacher	No transfer of learning beyond original class	Yes, but not from the PD	No technology use related to the PD	Adapted pedagogy to fit the module, but no evidence of transfer to other teaching	Teacher could not attribute her already existing enthusiasm for technology to the PD
		'It was really, truly just a set up for this project rather than real learning for either the kids or teachers involved'	*'That's our term four thing so we haven't done any of that. I can see the value … but as I said you can't do that in a fortnight'*	*'I suppose from "Inspiration". I don't think that's coming from that project, it's coming from somewhere else'.*	*'I can't say that any of the things that we are doing in technology have related to that'*		*I'm not reluctant to use technology, I love it, love it.*

★★★ High impact   ★★ Moderate impact   ★   Low impact or no impact

From this case—the least successful of the cases, but by no means itself a failure—it is possible to propose the characteristics that might militate against a successful experience in completing the online modules. It is unlikely that successful professional development through ICT online modules will occur when:

- Little information is provided to potential participants on the scope and sequence of the professional development content
- Online modules are not flexible enough to allow for different backgrounds and prior knowledge of participants
- Insufficient or no time release is given for completion of the professional development and teachers are expected to do it in their own time
- Online facilitators are not readily accessible
- Little support is provided by the school principal and other senior teachers, or they are unaware of the teacher's involvement in the program
- Individual teachers complete the program without another teacher in the school to provide peer support
- Little or no technical support is available within a school

This research study indicates that in such an environment, the professional development experience of the online modules would have the least chance of success in impacting on the use of ICT in the classroom.

High impact transfer factors

The modules appeared to have the greatest impact in terms of Transfer Category 2, that is, the greatest impact of transfer appeared to have occurred with the subject of the learning module transferring to other year level or KLA teaching contexts. It seems that teachers who have learnt the content of the modules and applied it successfully in one context are more willing to extend this to other areas of their teaching. This suggests that the content of the modules need not be targeted directly at a KLA or year level as teachers seem quite capable of modifying the subject knowledge for their own context. The modules also had a high impact on teachers' preparation for future learning. Teachers' confidence was consolidated and improved and they expressed a need for further professional development with a focus on pedagogy. This was summed up by one teacher: 'The technological skills aren't the important thing. The pedagogical skills are probably where my interests lie.' Another teacher with a similar view offered the approach ' …if I could see examples of other people's work then I'm sure I could modify it and use it here'.

Low impact transfer factors

The least impact in terms of transfer appeared to occur in Transfer Category 1, that is, how well teachers learned the subject of the package, whether connections were made, whether teachers monitored their learning and reflected, and whether they could speak knowledgably about the subject. From the interviews with case study teachers, it appeared that they learned very little from the online modules themselves. This could be interpreted as either failure to learn from the instruction given in the modules, or alternatively teachers learned little because they already had the subject knowledge in greater depth than provided in the modules. In the majority of cases it was evident that many of the teachers already had a background in the use of technology generally and, in some cases, quite specific and advanced knowledge of the software being used. The modules also had a low impact on transfer to other technologies and using appropriate pedagogy that took advantage of the technologies. The last aspect was clearly in evidence during the classroom observations. The extent to which these areas could be improved requires further research and investigation.

Discussion of results and implications

Both teacher learning and student learning is seen as a significant issue in initial learning and the transfer of learning. As Vrasidas and Glass (2004) observed:

> Students learn best when they are actively engaged in meaningful activities; when they collaborate with peers, exchange ideas, and provide and receive peer feedback; when they reflect critically on what they are doing; when they work on real-world, challenging, authentic activities; when their work is constantly evaluated; and when they are intrinsically motivated. But we tend to forget that teachers learn best in these ways too. (p. 2)

The online modules as a professional development exercise appeared to have been moderately successful. Even those teachers who overtly stated that they were frustrated or disappointed with the quality of instruction implicit in the modules, when probed, were able to report positive and sustained benefits for their pedagogy and their students' learning. Teachers used the modules in a variety of ways to suit their own needs, and in so doing, learned worthwhile strategies and approaches. Nevertheless, there were several recommended changes to the online program. The main observations that emerged from the analysis of teacher interviews and case studies relate principally to the design and implementation of the professional development program through the online modules, the community of support that teachers need, and the conditions that facilitate implementation of ICT based learning environments in schools.

Many teachers were critical of the online modules themselves for a range of reasons, as there were clear deficiencies in the design of many modules. As such, the initial professional development experience appears to have been a factor that influenced whether or not learning from the modules transferred to teaching practice. It appears that many modules did not reflect principles of adult education, nor were they based on recent research and theory in authentic learning. Tasks implicit in the modules appeared often to neglect the fact that teachers bring a variety of contexts and backgrounds to their own learning situations.

Another issue that seemed to impact on some participants' overall experience was some problems with the information that was available through the delivery of the online modules. Some had problems knowing whether they really wanted to do the modules and queried whether it would suit their level of professional need. In such cases, prior knowledge about the scope and sequence of the

learning environment, and the nature of the tasks would be important pre-enrolment information for participants. More flexible options for completion of the modules would also be valuable for teachers, many of whom felt constrained by the requirement to complete the modules within a given time-frame.

Teachers generally succeeded with the professional development when the learning environment was effective and when they gained appropriate support during the implementation of ICT-based strategies in their schools. School leadership that was open and enthusiastic toward ICT clearly facilitated teachers' professional growth, but it was helped even more by the support of colleagues and by IT knowledgeable teachers or support personnel. Time release given to teachers was crucial in ensuring that teachers had adequate preparation and reflection time. Facilitators were not mentioned often as being an important factor in teachers' professional learning, but they could provide the focus for the development of an online community of practice to support the consolidation and persistence of the experience. The establishment of such a community would allow teachers to share their strategies, ideas and stories, and could be implemented as a standard feature of the professional development.

In spite of the best intentions of teachers to implement ICT-based strategies in their teaching, on many occasions their attempts were thwarted by inadequate support in schools, and by inaccessible computer rooms and resources. Further problems presented with unreliable equipment, networks and software applications. Assurance from a Principal that adequate support will be available might be advisable as a necessary pre-requisite to the enrolment of any teacher in the professional development program.

The overwhelming impression of the case studies was that the teachers who completed the professional development were a committed and dedicated group of people who were keen to develop their own knowledge of ICT for the benefit of their students. In the main, they used creative and innovative techniques to facilitate their students' learning. They are critical consumers of professional development, and do not like to spend valuable time completing courses that do not add substantially to their knowledge of effective pedagogy. However, if given substandard instruction, these teachers generally actively seek to use the time they have been given to use all the resources at their disposal to make the experience worthwhile. Time is a luxury frequently denied teachers, and they were anxious not to waste the time given but to turn it into a productive and worthwhile experience. And generally they succeeded at this very well.

The findings of the study demonstrate clearly that professional development in ICT for learning cannot be conducted in measured 'doses' without consideration of: the school context, the mentoring and support available to teachers, the infrastructure and assistance available to ensure that technology use is relatively trouble-free, and the close connection that is necessary between technology use and constructivist approaches and pedagogies.

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