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Technology Together Getting whole schools involved with ICT through a metacognitive approach

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Professional development of teachers in information and communication technology (ICT) is an urgent educational imperative, presenting significant financial and strategic challenges internationally. While many teachers *are* now integrating ICT in innovative and educationally appropriate ways, there are still a significant number of teachers who are resistant to using technology, either personally and/or in their teaching. Moving a whole school forward as a technology-embracing school can be a significant challenge, and teacher professional development is generally seen as the 'solution'. Research, however, emphasises the importance of positive attitudes, values, beliefs and motivation, lack of anxiety and approach to learning as key factors in adoption of ICT by teachers. These factors are less frequently addressed through traditional professional development programs. This paper argues that schools need to embrace a culture of 'learning capability' - an approach which emphasises 'life-long' computer learning; where teachers are more self-directed in embracing new technologies and integration ideas, identifying what they need to learn and in driving the actual learning. This article describes a research project in which a metacognitive approach is being trialed as an approach to supporting whole-school change in the integration of ICT and in building a culture of computer capability.

Professional development for teachers in ICT is currently a major financial and strategic issue for government and non-government schools, both nationally and internationally. Significant inroads have been made in recent years in many schools, and integration of ICT is now becoming an assumed responsibility of *all* teachers. Recent evidence of this in NSW is the introduction of new Year 7-10 syllabi requiring ICT integration and the implementation in NSW of statewide-wide computer skills assessment for all Year 10 and Year 6 students.

Most school systems have implemented a range of ICT professional development initiatives to meet teachers' needs. For the most part such programs have employed competency-based training models [1][2]. However many challenges remain for schools in relation to teachers' ICT learning and subsequent integration in their teaching. Where professional development is provided on a non-compulsory basis, often those most "in need" do not volunteer to get involved. Where such

professional development is provided in a more compulsory sense, attitudinal resistance can get in the way of learning.

A major challenge for schools lies in the fact that technology evolves so rapidly that directive-style training becomes inadequate and out-of-date in a very short period of time [3], and teachers need to be engaged in continual, life-long learning in order to respond. Effective ICT PD requires changes in attitude, values and beliefs that develop confidence for ongoing learning and the right attitude to adapt to change. It also requires attention to the cultural and structural issues that either facilitate or limit effective learning by teachers. For teachers to effectively integrate ICT in learning and teaching the culture of their school needs to be supportive, not only in resourcing technology access, but in encouraging teachers to continually learn and experiment with changes in pedagogy. Previous research [4-6] into factors impacting on learners' approaches to ICT indicates that teachers need to be encouraged, but not pressured, supported but not over-assisted, stimulated with ideas to enhance perceived usefulness and adequately resourced without forming an impression that resources alone will lead to effective ICT integration. Such changes take time, resources, willingness to learn and on-going support, and there are 'no quick fixes'. One approach to learning that acknowledges and utilizes such dynamics is based on metacognition.

What is the metacognitive approach?

'Metacognition' refers to "thinking about thinking" or "learning about learning". It refers to knowledge concerning one's own cognitive processes, and the active monitoring and regulation of these processes in the pursuit of goals [7-9]. This involves teachers in reflecting upon their past and current feelings, attitudes, beliefs and motivations regarding computer use; their self-efficacy and attributional patterns; their educational or social concerns regarding ICT; their past, current and potential ICT learning strategies; help-seeking patterns, and goal setting and achievement.

The metacognitive approach to computer learning is therefore founded on the premise that adoption and integration of ICT by teachers is influenced by their attitudes, beliefs, values, motivation, confidence and learning strategies. The metacognitive approach encourages teachers to think about themselves as computer *learners*. We believe that for teachers this not only assists them to develop their own confidence with computers and their willingness to try new integration ideas, but that it also has a significant impact on their understanding of how their students learn.

Underpinning the metacognitive approach is a distinction between supporting teachers to become *competent* with computers, versus supporting them to become *capable*.

Competency based approaches are widely employed in the teaching of computer skills both in industry, TAFE and schools. Under the competency based system importance is placed on learning and demonstrating specific and defined skills. With this approach a list of skills or knowledge is compiled. These specific skills are then taught, usually within a controlled environment such as a computer lab with all learners are using the same software, the same computers and the same set of steps. Learners are 'ticked off' when they can perform these skills.

Capability, in contrast, is 'an all-round human quality, an integration of knowledge, skills and personal qualities used effectively and appropriately in response to varied, familiar and unfamiliar circumstances' [10]. Many self-taught computer-using teachers might be seen as being capable. These teachers use computers out of their own interest and enthusiasm, without substantial training. They feel comfortable about learning any software, are willing to 'have a go' and are generally not intimidated by computers [11]. A capable computer user has an ability to adapt to change, employs self-directed learning strategies, has a willingness to experiment, recognises appropriate avenues for integration, and is prepared to persevere. Competency is, of course, an ingredient of capability, however capable people are those who can operate in unknown contexts and with new problems.

Capability thus is a much stronger characteristic than competence in areas which are subject to rapid change, such as in the context of ICT.

Why is the Metacognitive Process Useful?

When people are prompted to think about their values, beliefs and their past experiences they will often start to recognise factors that impact on their learning and this recognition can bring key insights into how they can help themselves to change. It can assist them to realise the strengths and limitations of various learning strategies and change their perspectives and behaviours. Computer learners can also be prompted to see that becoming a proficient computer using teacher is more about their attitudes and learning strategies than it is about having some "magic" personal quality or set of skills. Even for teachers who are relatively comfortable with their computer skills, the metacognitive approach can prompt them to move outside their current comfort zone and try new things with their students.

The metacognitive process is also valuable in challenging teachers' ideas about learning and teaching. In a number of articles, Mal Lee [12, 13] has challenged readers to consider the learning approaches of the 'net generation': learning approaches which are chaotic, constructivist, integrated and multi-faceted, and where 'play' is central. These young people, Lee claim, chart their own learning pathways, set their own goals, 'learning' is incidental and a sense of 'fun' is paramount. Amid such seeming chaos, these young people develop skills, beliefs and attitudes that many educators have been trying to foster in the school system for years; namely independent and self-directed learning. It is these learning characteristics which lead our young people to be (generally) ready adoptors of technology. And it is this form of exploratory and "play" based learning which the metacognitive approach seeks to promote with adults.

By reflecting on the learning approaches adopted by young people or other proficient adult computer users, teachers can be supported to realise that they too can adopt some of the learning strategies of their students. They can also be challenged to embrace new dynamics within their classrooms, where they can learn *with* and *from* their students. Teachers are also encouraged to reflect on the use of ICT by their students outside the school context and to seriously consider ways in which students ICT use in the home environment can be incorporated into their planning.

What is the Technology Together Project?

The *Technology Together* project is aiming to develop not only *capable* teachers but *capable school communities*.

Technology Together is a collaborative research and development initiative of the Catholic Education Office, Lismore Diocese and Southern Cross University. The project has received funding for 2004-2007 from the Australian Research Council (ARC). The research aims to:

- determine the effectiveness of the metacognitive approach in supporting teachers' professional development in ICT in a whole-school context;
- develop and refine practical approaches to schools' implementation of the approach;
- understand the role of school executive in influencing teachers' approaches to computer use;
- enhance understanding of the nexus between school culture and ICT integration;
- produce research-based and tested professional development facilitation resources that can support schools' approaches to teacher PD in ICT.

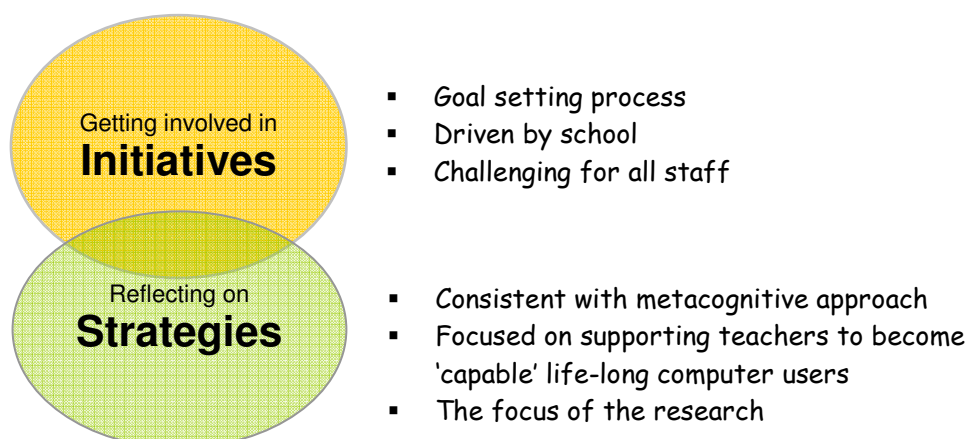
In a practical sense, the project aims to: increase teachers' confidence in using computers; increase teachers' integration of ICT in their teaching; support teachers to implement curriculum and scope

and sequence documents; diversify teachers' ideas and knowledge about how they might integrate ICT and increase teacher dialogue within the whole-school context regarding ICT.

As an action research project Cycle 1 (2005) of *Technology Together* involves Pilot Schools in planning, implementing and evaluating initiatives and refining various metacognitive strategies. Cycle 2 (2006) involves Trial Schools implementing the approaches documented in Cycle 1, and refining these further. Volunteer teachers, referred to Companion-Mentors (CMs), are working with teachers in their schools and University researchers in facilitating and refining the approach. School Executives (i.e. principal, deputy principal and/or other key staff) will be integrally involved in promoting the project and supporting the work of Companion-Mentors.

The metacognitive approach has a clear focus on experiential learning, encouraging teachers to implement initiatives in their classrooms, thus resulting in immediate learning outcomes for students. Schools identify and focus on *initiatives* which are most relevant to their own school needs. Part of the project is to refine this whole-school goal setting process, so that all teachers are challenged. Schools might undertake a one year-long initiative or three separate initiatives, one per term.

Schools are also asked to develop and trial *strategies* consistent with the metacognitive approach, which might include: regular informal discussions with teachers; weekly or fortnightly meetings or similar small-group processes; blocks of side-by-side work with individuals or small groups such as year level or KLA; time for sharing or celebration across the school.



Teachers are given flexibility in the *initiatives* they undertake and the *strategies* they employ, but are expected to reflect upon and refine these strategies in the light of their experiences and input from 'critical friends'. Examples of the initiatives being implemented include teachers beginning to use data projectors in their everyday teaching, integration of ICT into creative and performance art, increased use of interactive whiteboards, or adoption of new software. Strategies being employed include team teaching, peer-supported learning, collaborative problem-solving and reflection on successes and problems encountered.

Where is the project currently up to?

Technology Together is currently in its early phase, with seven selected pilot schools in the midst of implementing the project. Much is being learnt about what works and what doesn't, and how the approach can be best refined to fit with the busy day-to-day lives of classroom teachers. The project has been strongly supported by the Catholic Education Office, Lismore Diocese and the schools and teachers involved.

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