A New Zealand perspective about this convergence will be shared using the practical experiences of schools and the significant body of research published under the Digital Opportunities banner within Project ACTIVate. The shared experiences have been used to develop both the pedagogical and ICT perspectives within a ‘Thinking Curriculum’ A talk/sharing will deal with this topic in relation to the ‘Knowledge Society’ (Gilbert 2005) and the innovative use of IWB (Interactive Whiteboard Technology) as a facilitatory tool. The discussion will encompass; The convergence of pedagogical and technological innovations remains controversial and problematic in the literature. ‘In education, computer technology has promised much over the last fifteen years and schools, together with other institutions, especially in the main Anglophone nations, have invested considerable sums of money over this period in coming to terms with this technology’ (Bigum & Kenway, 1998, p.375). Schools have had to respond to the pressure of the power of computer technology but synthesising innovative teaching and learning approaches with ICT are somewhat experimental. There is a lack of research, particularly in the New Zealand context, on the manner in which these innovations augment and complement each other. However, there is research from the United States from the mid 80s, when The Cognition and Technology Group at Vanderbilt (1996) focused on the development and implementation of motivating, challenging and contextualised learning activities by providing stimulating problem solving situations and incorporating the use of technologies. A recent report from Programme of International Student Assessment (PISA) (2006) entitled Are Students Ready for a Technology-Rich World? is still promoting new learning ways of learning with ICT. The report conjectures that these new ways will have ‘profound implications for education because ICT can facilitate new forms of learning and because it has become important for young people to master ICT in preparation for adult life’ (p.1). In this report however, there is no mention of the critical role teachers will play in the new forms of learning. In New Zealand, the question as to whether MoE’s ICTPD initiatives have produced better quality teachers who integrate ICT well in their teaching and learning programmes is difficult to answer (Brown, 2005). In Brown’s (2005) view, it is necessary to help teachers to see the bigger picture which engages them thinking about ICT in their classrooms.

The cognitive learning perspectives are at the forefront of the teaching and learning debates that are aligned to ICT. The metacognitive and the socio-cultural perspectives are very much intertwined with the other cognitive learning perspectives because their attributes can be seen in the attributes of learning as Driscoll (2002) points out: learning is active, social and reflective, and happens in a context. The information processing model is strongly promoted by the School Library Association of New Zealand Aotearoa (SLANZA) (2005) in their Draft SLANZA Development Plan. Central to the information processing model is that information savvy learners are learners who know how to learn and how to process information (SLANZA, 2005). The situated cognition literature offers the strongest support for PBL and situated cognition is apparent in the classrooms as the PBL approach or design. The design encompasses two important principles: (a) learning for meaning; and (b) the transfer of knowledge (Jeong-Im & Hannafin, 1995). The PBL approach has an emphasis on just in time learning because of the nature of the urgency or validity of a problem and the multiplicity of ways to solve the problem or query by either more traditional means or technological means. However, there have been classic arguments and counter-arguments in the Educational Researcher since the mid 1990s over the validity of this approach to teaching. Some researchers believe that there are some inherent difficulties and contradictions in this type of educational strategy (Savin-Baden & Wilkie, 2004) and that there have been a range of varied practices undertaken under the banner of PBL.
And again, there is a continued debate as to ‘what counts as problem-based learning and what does not’ (Savin-Baden, 2003, p.88). Further research is needed about how teachers or facilitators understand PBL and just what kinds of support should be provided for them (Savin-Baden, 2003). Today educators are interested in a wider view of PBL because of ‘its emphasis on active transferable learning and its potential for motivating students’ (Hmelo-Silver, 2004, p.235), an emphasis supported by Perkins, (2003) and Perkins & Salomon (2001). Again, there is much support for the constructivist perspective and technology (Dalgarno, 2001; Jonassen, Peck & Wilson, 1999; Jonassen, Howland, Morre, & Marra (2003); Leask & Younie, 2001). Some researchers see that technology can facilitate learning by providing real world contexts that engage learners in solving complex problems. Technology has the potential to change curriculum delivery (Jonassen et al, 2003; Jonassen et al, 1999; Perkins, 1991). Leask & Younie (2001) argue that various forms of ICT add elements of additional value to constructivist learning environments. Dalgarno (2001) also recognises that theoretical shifts in pedagogical theory towards interpretations of constructivism have had some consequences for Computer Assisted Learning. However, change in pedagogical practices was not apparent in the research carried out by Dexter, Anderson, & Becker (1999).

Venezky’s (2004) study based on 94 case studies of successful school reforms where ICT was heavily used, found that ‘as teachers became more technically competent, their general pedagogical abilities and their ability to integrate ICT into the curriculum became more important’ (p. 15). Venezky also conjectured that ICT was not a catalyst for school pedagogical change but rather that it was a lever for change. He insisted that ‘both the ICT infrastructure and the planning and professional development for pedagogical change are done in parallel’ (p.11). With this in mind, he also stated his research demonstrated that ‘the most successful staff development programmes taught both ICT skills and related pedagogical skills, including how to integrate ICT in teaching’ (p.15). The British Educational Communications and Technology Agency (BECTA) Report (2004) about barriers to the uptake of ICT by teachers identifies a range of key findings. The most important findings that relate to this review are: (a) lack of technical support for teachers; (b) the amount of training given to teachers; (c) level of teachers’ confidence in ICT usage; (d) level of teachers’ access to ICT; and most importantly, (e) teachers’ resistance to change. The report noted particularly, that there was a lack of pedagogical training, relating to and integrating ICT with pedagogical practices. However, the report did not suggest that pedagogy and technology should be brought together in a more holistic way so that teachers could perceive the benefits for teaching and learning. Rather, it suggested that teachers should look at examples of best practice where ICT has been integrated with the curriculum. Again in New Zealand, some of the major findings of the MoE’s ICT in Schools 2005 Report were concentrated on: (a) the use of ICT; hardware, software and the internet in schools; (b) the use of ICT by teachers and principals; (c) the amount of ICTPD for teachers; and (d) the priority given to ICT and its use in the future. There was no mention of the pedagogical aspect except that ‘schools are demonstrating a strong interest in e-learning, with the technology infrastructure already in place’ (MoE, 2005a, p.6). As one of the barriers to integrating ICT with pedagogical practices is the resistance to change then, teachers and principals need to heed Riel & Becker’s (2000) strong words on teachers’ practices with the integration of ICT:

*Teachers who assume a professional orientation to teaching are far more likely to have made high investments in their own education, to have constructivist-compatible beliefs about education to develop the instructional practices that are related to their beliefs and to integrate computers into their classrooms in ways that support meaningful thinking and sharing of ideas with their peers. . . . The social structure that teachers create for student learning in their classroom mirrors their own relationship with their colleagues (p.34).*

A more blended approach to teaching and learning, incorporating a range of cognitive learning perspectives and integrating the use of ICT may be an appropriate way forward for the 21st century. Sfard (1998) even goes as far as
stating that a unified, homogeneous theory of learning may have to give way to a variety of theories. Thus, the very nature of the cognitive learning theories with its various perspectives may preclude a unified theory of learning. Because as Dede (1998) states, learning, a ‘very complex and idiosyncratic process requires, for each pupil, a repertoire of many different types of instruction orchestrated together’ (p.11). So, attached to any approach or perspective will be the expectation that teachers will have to reconcile for educational purposes, the use of a wide variety of technologies in a multiple of ways (Bebell, Russell & O’Dwyer, 2004). To move the debate forward, the question they ask is: ‘[How is a teacher] making use of various technologies and for what purposes?’ (p.59).

More recently, some research (Ryba, 2005; Beauchamp & Parkinson, 2005) about change in teaching and learning involves the emerging technology of the interactive whiteboard (IWB). Much of the literature about this technology appears to be in the form of anecdotal examples of the usage and looking at the impact of student attainment, for example BECTA, ICT Research (2003a; 2003b). As an example, a two year study undertaken by Higgins, Falzon, Hall, Moseley, Smith, Smith & Wall (2005) ‘to investigate the impact of the use of electronic or interactive whiteboards (IWBs) in literacy and mathematics lessons in primary schools [found the impact was hard to identify in terms of learning]’ (p.67). Their investigation was centred particularly on attainment. There was an absence in the study of evidence of using the IWB in a learning context that embraced the notion of active and meaningful learning. Smith, Higgins, Wall & Miller (2005) also reviewed the literature concerning the introduction of IWBs and ask what ‘the intersection between technical and pedagogic interactivity looks like in reality?’ (p.99). Although the literature revealed a preference for IWB use by both teachers and students, they cautioned that evidence needs to be collected so that ‘the processes of teaching and learning with this new technology are fully understood and more conceptually conceptualised’ (Smith et al., 2005, p. 99). Their research suggests that teaching strategies using IWBs ‘have done little to change traditional patterns of whole class interaction, with teacher questioning and feedback only rarely being used to assist pupils to articulate more complete or elaborated ideas’ (2005, p.1). National Strategies in England and Wales have promoted pedagogies that emphasise interactive whole class teaching and a huge investment has gone into IWBs. Tanner, Jones, Kennewell & Beauchamp’s (2005) study of teaching and learning with IWBs ‘suggests that deep rather than surface features of interaction must be addressed if learning is to be improved’ (p.720). It would seem that some of this research is looking only at the interactivity on the IWB and the student reaction to that activity. Whereas, in New Zealand on the other hand, some modest investigations taking place in learner-centred environments, looked at the interactivity of the IWB with student participation on a number of levels, such as the socio-cultural, cognitive and metacognitive. The New Zealand study, involving twelve school-based projects working under the MoE, Digiops, Project ACTIVate (2005b) banner, have been undertaking research studies asking the question ‘In what ways and to what extent can IWBs be applied to create better learning conditions?’. Ryba (2005), the academic consultant of Project ACTIVate suggests that ‘attempts to measure the ‘effects’ of ICT have proved complex and difficult. This is not surprising, as new education technologies are a technical object that must be applied within a specific learning and curriculum context’ (p.4). Therefore, teachers participating in these Project ACTIVate research studies were mindful of applying characteristics of effective teaching and learning (Alton Lee, 2003) in the IWB context and were then encouraged to share their findings with the wider educational community in a special issue of the journal, Computers in New Zealand Schools (Ryba, 2005). These school-based projects portrayed some unique elements that encompassed some of the ‘bigger picture’ issues of teachers thinking about learning (Brown, 2005).

The projects included the following elements:

- **Personal – teachers seeking to study, change and improve their own professional practice;**
• Participative – students, teachers and researchers working together in order to plan the research process;
• Evidence-based – the researchers dealing with information and data in order to assess the impact of the projects; and
• Reflective – critical reflection by teachers, students and researchers on the process and outcome leading to further changes and improvements (Ryba, 2005).

What was particularly noticeable in these projects, was the development of what Ryba (2005) and Alton Lee (2003) call cohesive learning communities comparable to Lave & Wenger’s (1991) communities of practice. The learning communities demonstrated collaborative group work, shared teacher and student research and active learning orientations but most importantly the ‘pedagogical practice was based on interdependence between social-cultural and cognitive dimensions’ (Alton-Lee, 2003, p.vi). The interdependence of the social-cultural and cognitive dimensions is the element that is missing in the Higgins et al. (2005) research. It would seem that student participation in these cohesive learning communities demonstrated the existence of elements of social-cultural relations and cognitive conflict and that participation in the communities was further enhanced when augmented with the use of the IWB. In this context, the IWB was then seen to act as a functional learning tool (Mehan, 1989). All these elements together added a new dimension to classroom interaction and participation (Mehan, 1989; Yelas, 1996).

REFERENCES