A Literature Review:
Investigations into the impact of leadership styles and management strategies on cohesive and transformative ICT integration in primary schools.

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Abstract
This paper attempts to draw connections between the extensive literature on management and leadership in schools and the research on Information Communication Technology (ICT) integration. Recent studies show the problematic relationship of management and leadership practice with meaningful ICT integration (MacDonald 2006) The paper will distinguish transformative ICT integration from other levels of ICT integration as they apply not only to classroom settings, but also to school structure. Some of the current literature reveals that many schools are not enjoying long-term meaningful reforms in the area of ICT integration. This paper will reflect on the literature to identify some of the possible explanations for this lack of success. It will be argued that leadership for cohesive ICT integration requires an appreciation and consideration of the influencing factors on ICT integration and their subsequent alignment. The need for further research into the role and responsibilities of educational leadership in the transformative integration of ICTs will be highlighted.

ICTs "are requiring us to reconfigure our economic, social, cultural, political and organisational structures and relationships, together with their supporting legal and regulatory frameworks. We maximise our chances of benefiting from the imperative for change by approaching it pro-actively rather than reactively" (DETYA 2001). While approaching change proactively is important, change needs to be approached from an informed perspective. Decision makers and all educational stakeholders need to be informed of current and future trends of ICTs in education. Policies formulated and practices encouraged in schools should be founded on and supported by relevant and current research.

The impact of ICTs in education may be considered slow on the uptake when compared to the impact of ICTs on industry infrastructure. Banking is a prime example where the subsequent changes in practices, which have been encouraged by market leaders, have further increased efficiency, productivity and profits, where users have modified their behaviours to the extent where services such as online banking are not only convenient but preferred for many banking customers (ACNielsen 2002). The educational community is also beginning to appreciate the far-reaching implications of ICT integration. Not only will traditional teaching practices be challenged but also the parameters within which learning occurs. "While the integration of emerging technology into education portends a paradigm shift - a revolutionary one according to many in both pedagogical practice and educational philosophy, the way forward is not always clear" (Millear, Green, Putland, et al. 2005). Current and future ICT innovations will have major ramifications for all educational stakeholders, in particular for educational leaders.

Current ICT innovations in education which may potentially have major impacts include the use of:

Interactive Whiteboards

Web conferencing

Wireless technologies with advantages such as "flexibility and mobility: Wireless networking allows users of laptops, notebooks, PDAs, tablet PCs and wireless Voice Over IP (VoIP) telephone devices to roam freely on campus while remaining connected to the school's network" (CoSN 2006).

Handheld computing options which are appealing in educational settings due to their relative low cost may increase the likelihood of students having one to one access with a potentially mobile technology. (CoSN 2006)

Web 2 and social computing

To some extent the impact of ICTs in education can be attributed to greater accessibility of ICTs, and the increase in Internet speed and availability of broadband. "As technology

develops with its characteristic high speed, the following technologies are emerging for future use:

Continuing development of the Internet and the Web
Continued improvement in wireless technology
Machine translation
Local power generation
Speech recognition software" (Cabanatan, 2001)

The above mentioned advancements and the evolving nature of ICTs highlight that ICT reforms cannot be approached in the same manner as reforms in other areas of education. The integration of ICTs do not merely require the implementation of government initiatives, nor is there a definitive end to the process of integrating ICTs; it is not isolated in its impact but rather has wide reaching implications for learning across all curriculum areas and for all members of a learning community.

ICT reforms require consideration of issues such as budgeting, staffing, resourcing and training; these are not uncommon considerations for other reforms. However in addition consideration of issues such as building and managing infrastructures, networks, intranets, discussion boards, managing large amounts of information, developing skills and strategies to support the creation of knowledge and utilization of ICTs, keeping up with the new technology and the related terminology. These can all be addressed in educational settings by building ICT capacities.

In conjunction with building ICT capacity there is a need to devise strategies to deal with resistance to change, coping with continuous change, and providing support structures in change rich environments in order to sustain reforms. These aspects can be addressed in educational settings by building change capacities.

Investigating the issues associated with dispersed leadership and exploring leadership structures that compliment transformative ICT integration will also be valuable. Redefining roles and expectations, and exploring options for relevant ongoing professional development for leaders are all aspects that can be addressed in the building of Leadership Capacity. Managing issues such as copyright, privacy and online safety, and establishing new protocols for communication in email, chat rooms, blogs, mobile phones, policy development etc, are all aspects that can be addressed in the building and establishment of School Capacity. In addition when addressing ICT reforms there is an element of uncertainty and dealing with unknowns. For example how will education remain relevant? How can education prepare students with the skills for some not yet created employment opportunities? "Although it can be anticipated that the increasing use of ICTs in education will change the nature of the knowledge and skills students must acquire in order to compete and contribute in an increasingly ICT dominated global economy, what skills will be necessary is not clear" (Blurton, 1999).

The issues associated with each of the above mentioned capacities will be further explored in subsequent sections of this paper.

Another major consideration is that the level of ICT integration will vary depending on factors such as the support structures established, the approach to change and the acceptance and willingness to change, the available infrastructures, the access and participation in training and development etc. Educational Leaders can have a major impact on the success, coherence and sustainability of the change process. However to date very little of the available literature distinguishes between how educational leaders impact on the different levels of ICT integration, and yet the impact on student learning and overall structure of the educational organisation will vary markedly depending on the level of integration implemented and supported by educators and educational leaders.

Making Better Connections (DEST 2002) describes the various levels of ICT integration:

'Type A; encouraging the acquisition of ICT skills as an end themselves;
Type B: using ICTs to enhance students' abilities within the existing curriculum;
Type C: introducing ICTs as an integral component of broader curricular reforms that are changing not only how learning occurs but what is learned;
Type D: introducing ICTs as an integral component of the reforms that alter the organisation

and structure of schooling itself.'

Many learning communities have accepted and are integrating ICT at a Type A or Type B level. Integration of ICTs at this level has very little impact on curriculum frameworks and pedagogies. ICTs tend to be incorporated into existing curriculum and policy structures. However 'integrating technology into existing curriculum may be an awkward and perhaps misguided retrofit' (November 2000). Although student outcomes may experience technologically enhanced improvements, it is still only occurring within existing frameworks and within the parameters of existing pedagogies.

DEST (2002) Type C and Type D level of integration differs in that it challenges learning communities at all levels to initiate and sustain reforms that not only modify but create new understandings, policies, structures and pedagogies that enable the potential of ICTs to be fully utilized. 'Emerging information technologies enable a shift from the transfer and assimilation of information to the creation, sharing, and mastery of knowledge' (Dede 1999). The implications for learning and teaching at this level need to be clarified and the values and beliefs that underpin educational practices need to be explored and challenged. This shift in thinking and approach may further contribute to the alignment of learning and teaching pedagogies so that the needs of learning communities can more adequately be addressed and catered for. Educational leaders need to acknowledge that in a dynamic climate training is essential if the change is to remain sustainable. 'Continuous learning at all levels within the community is important to help deal with the demands of evolving change' (NCSL 2001). Although research supports the need for an integrated holistic approach to change, ICT integration and leadership, further investigations into the role of educational leaders in this process will help shape support structures and the content of training programs. In-service professional development programs that target the needs of the school community are essential if ICTs are to have a meaningful impact on learning (OECD 2001).

The need for further investigations into this area is also highlighted by the frustrations and disappointment experienced by educational stakeholders as they attempt to integrate ICTs effectively so that ICTs:

- Are fully utilized
- Have a positive impact on student learning outcomes
- Improve the efficiency of the educational organisation so that it can provide adequate and relevant experiences that meet the needs of its learning community.
- Challenge existing learning and teaching boundaries.

Current literature (Fullan 2001; Hay 2001) acknowledges that many schools are not enjoying long-term meaningful reform in the area of ICT. Some of the possible explanations identified in the literature include:

- 'There seems to exist a lack of information leadership in ICT integration – the majority of ICT leadership in schools is fundamentally pushing a technical approach, rather than an information-based integrated approach.
- Emerging technologies in some cases seems to be driving schools' ICT agendas, rather than educational outcomes' Hay (2001).

Research reveals that although schools are focusing on ICT, the emphasis has been on resourcing and not the pedagogies that will ensure the survival of the reform over the long term. 'In relation to the implementation of ICT staff need to not just operate them, but to have an understanding of the pedagogy required to use them and to meet teaching and learning needs' (Tearle 2004). Successfully implemented reforms require stakeholders across all levels to actively participate in the learning process so that their beliefs and practises can evolve to meet new challenges. Fullan (1998) highlights that in dynamic changing environments leaders need to participate as active learners. This allows new experience based learning to inform reform developments and provides opportunities for all learners, including educational leaders to develop an understanding of the different levels of achievable ICT integration. However current research identifies limitations of training programs offered to educators (Phelps, Graham & Kerr 2004). The approach to existing training and development programs tends to be disjointed and uncoordinated with the main emphasis centred on skill development with little focus on pedagogies. 'The recent Inquiry into the Provision of Public Education (Esson,

Johnson & Vinson 2002) has highlighted significant concerns relating to teacher professionalism, including a critical need to redress the lack of fiscal support for teacher

professional development. In particular, teacher professional development in computer technology has become a major priority at state and national level' (Phelps, Graham & Kerr 2004).

Educational leaders are under increasing pressure to react to and manage issues related to technology and the educational community (Jacobsen & Hunter 2002). 'While the need for change will apply to everyone, the role of managers, decision makers and leaders will be crucial. The research does acknowledge the important role of the leader in the process of ICT integration. They will spearhead the processes of identifying the changes that are needed in their local contexts, engaging their respective communities in the change process and carrying through the adjustments that are needed' (DETYA 2001). Although infrastructure is important, leadership is the critical element in establishing technology as a part of school culture (Anderson & Dexter 2000).

The remainder of this paper will discuss the possible impact and influences of leadership on the building of School, ICT, Leadership and Change capacities. Two elements of Change, namely Sustainability and Cohesiveness have been identified as fundamental criteria in the development and understanding of effective change processes. 'Capacity as a concept describes the degree to which a school can manage the process of change and thereby create the context for sustained renewal' (NCSL 2001). It will argued that the four core areas which have been identified in the literature as areas that may have significant impact on the success of coherent ICT integration process need to be developed simultaneously in educational settings and not in isolation from each other. Continued research will enable learning communities to maximize the potential of ICTs and to progress to Type C and Type D (DEST 2002) transformative ICT practises and pedagogies.

Change Capacity

Fullan (2003) suggests, 'it would be naïve to hope that the overall pace of change will noticeably decrease' this is clearly evident in education, particularly where ICT is concerned. Many schools are overwhelmed with the number of reforms expected, and in many schools where change is a constant; schools are not seeking additional changes but rather are attempting to understand existing changes (NCSL 2001). Often the mistaken perception is that change is an event not a process. This attitude impacts on the integration of an innovation, often contributing to unrealistic expectations and disappointing results.

'While innovation needs to be an accepted part of any professional practise, education authorities do need to be aware that change is already a constant feature of schooling, with organisational, administrative and curriculum change dominating the work of schools in ways that some see as a distraction from the outcomes at which innovation is aimed. From this point of view the stability to properly establish and evaluate innovative approaches is important' (School of Education, James Cook University 2003) Literature to date has not specifically addressed ways of identifying different approaches to change. No criteria has been devised to help distinguish between different approaches to reforms, nor is it clear if the attitudes of participants vary depending on the overall approach and expectation of the change. Investigations into the relationships between the attitudes of participants towards change and the level of ICT integration achieved can inform the development of training programs that promote an understanding and appreciation of attitudes that support transformative reforms in ICT.

'One of the first concerns that people have about change is its effect on themselves' Hargreaves (2004). Transformative ICT integration will require leaders and educators to question their practices, attitudes and beliefs. Research has explored attitudes towards change (Hargreaves 2004) and attitudes towards ICT and Leadership (Schiller 2002) however literature does not specify if it is the attitude towards ICTs or the attitude towards change itself that is the more significant concern for those participating in ICT reforms. Investigation into the connections between attitudes and reservations associated with ICT and the general

reservations associated with participation in reforms will provide information that can be incorporated in the development of programs and structures that address the issues associated with change and achieving sustainable, coherent ICT integration.

Change impacts on social structures 'change must therefore focus on personal as well as organizational change' (Tearle, 2004). It is just as important to invest in the development of supportive learning cultures, as it is to invest in resources. However further investigations into the experiences and practises of schools may reveal the priorities that are currently being identified by school communities in relation to ICT integration and whether or not these priorities compliment the integration of Type C and Type D (DEST 2002) ICT integration. It may also reveal if the focus is predominately on resources and infrastructure or if leadership is acknowledging, addressing and managing other essential aspects associated with supporting the learning community during the ICT integration process. The information gathered from further research will enable gaps in the integration process to be made explicit and can then be used to inform future action plans.

To appreciate the importance of the change process in the integration of ICT, educators need to acknowledge, 'the learning potential will not be realized unless we learn to incorporate the knowledge of the change process' (Fullan & Smith 1999). Educational leaders have the responsibility to be active participants in the integration of ICT. Fullan elaborates by stating, 'there is a need to be an expert in the understanding of change as much as there is a need to be an expert of a topic' Fullan, (2002). 'By and large the dramatic developments in the domain of technology and learning have not been informed by knowledge of the change process' (Fullan & Smith 1999). Further investigation may reveal that this is a significant factor in explaining some of the obstacles that have delayed the cohesive integration of ICT. Understanding the change process and providing long-term training, mentoring and financial support needs to occur within all levels of the education system. (DETYA 2001).

Fullan (2003) reviews the principles of Jim Loehr and Tony Schuarts who discuss the importance of 'balancing energy expenditure with intermittent energy renewal' It is important to maintain perspective 'The goal is not to innovate the most but rather to innovate selectively' (Fullan, 2001) This is particularly relevant in the area of ICT, where it is easy to channel efforts and funding into integrating the latest technological innovations at the expense of the development of other necessary components, such as training and development that support relevant pedagogies for sustainable ICT integration. The literature has not explicitly identified the strategies that can be adopted to achieve an approach where the focus is balanced across all the areas required to build ICT capacity such as infrastructure, training and policy development etc.

Leadership Capacity

'In spite of rapid changes in the new knowledge-based global society and associated educational expectations, there remains tardiness in addressing the need for leadership in the educational technology domain' (Steed, Hollingsworth & Marzek 2005). The actions,

attitudes and visions of leaders and administrators have the potential to greatly impact and influence the integration of innovations. 'Administrators who implement technology effectively in their schools and communities will contribute greatly to both education and the economy in the twenty-first century' (Slowinski 2000). It then stands to reason that leaders need to have access to training programs, frequent practical experience and support structures that will enable them to develop the understandings, skills and resources that will lead to appropriate positive reform in their school setting. Although the need and value of training and development is indisputable, the content being promoted and addressed in the training sessions for educational leaders requires further investigation. Is it the type of information that can be used to construct new and more appropriate pedagogies and are examples provided that demonstrate the achievable aspects of transformative ICT integration, or is the focus predominately on skill acquisition? Unfortunately a limited amount of research in this area is reflected in the conservative, traditional approaches to ICT training and development that are currently available. If the educational community agrees 'by taking an active approach to innovation, principals can foster an environment in which such innovation has greater benefits for their staff and students' (Schiller 2003) then research that will inform

training and development content and approaches is essential.
Previous descriptions of leadership roles in education are not transferable to current educational settings and do not address many of the issues that are associated with the integration of innovations, simply because the impact of ICT on education and in society has previously not been experienced to the extent experienced by schools and society today. The literature does not identify specific role descriptions for leaders involved in the ICT reform process. However a need does exist for all who have the potential to impact and influence the ICT integration process, including educational leaders, to be clear about their personal responsibilities and roles in this process and to acknowledge the overall responsibility of schools to prepare students for a technology enriched future. Clear expectations may help to avoid misunderstandings and may provide foundations for smoother transitions in a changing climate.
Research into the effective approaches, attitudes and skills that support Type C and Type D (DEST 2001) ICT integration will provide the means to clarify, redefine and redesign leadership for relevant education for the 21st century. 'Technology leadership has multiple dimensions, given the complexity of schools as learning organizations' (Flanagan & Jacobsen 2003). Leadership and ICT integration are multifaceted, complex processes that often require the questioning of practises and beliefs, the building of capacities and support networks that will assist the learning community make the transition to Type C and D (DEST 2001) ICT integration. 'Often, educational leaders have to make sound decisions about both professional development opportunities for teachers and the acquisition of technology resources without ever having used digital tools in their own teaching' (Jacobson & Hunter 2003). Support for educational leaders is required to help ensure the success of ICT integration at Level C &D and the progress of school cultures in which expectations are clearly defined, and a commitment to change is made.
'The successful adoption of ICT to improve student learning requires effective leadership and planning' (MCEETYA 2005). Leaders need to be aware and capable of addressing associated issues competently and confidently. Although planning is identified in the literature as necessary, some of the questions that need to be addressed include: What planning strategies can support Type C and Type D (DEST 2001) integration of ICTs? What realistic timelines can be put in place? What are the effective ways of monitoring the learning journey during the integration process? Research in this area can reveal examples of successful learning communities and can inturn be used as a platform from which other educational communities can model and design their own integration process. 'As school leaders move beyond the

issue of merely ensuring access, they must develop strategies to sustain technology in their schools while taking into account the total cost of ownership. This clearly requires thoughtful planning based on how technology can be used effectively as part of a long-term schoolimprovement plan directed at improving learning and achievement goals' (Slowinski 2000)
Until learning communities target reforms at the level, where pedagogy, attitudes, beliefs and approaches undergo transformation then school communities will continue to feel that there is no coherence or consistency in the change process. Leaders in particular need to make building coherence a priority. 'Effective leaders must always work on connectedness or coherence making' (Fullan 2002).
Yee (1999) focuses on leadership directly related to ICT integration and Schiller (2002, 2003) on the practises and behaviours of leaders that support ICT integration, specifically 'Change Facilitators Styles', there is little if any literature that explores how leadership manages and implements the change process in order to achieve the type of ICT integration that alters the pedagogies and becomes firmly embedded into the structures of the learning institution, into the ICT approaches, policies, visions and skills demonstrated by the learning communities. This is the level of integration (DEST 2002) describes as 'transformative at the systemic level, leading to changes in the organisational and structural features of schooling as well.'
The literature identifies the importance of challenge and reflection in an integration process (Fullan 2001). However, the specifics of what constitutes a challenge in the ICT integration process and what strategies can be employed to help ensure full community participation in a reflective process have yet to be explored in detail. This requires clarification if educational

leaders are to provide the opportunities and means for achieving transformative ICT integration in education.

School Capacity

Fullan (2001) identifies 5 components of school capacity: 1) teachers knowledge 2) professional community 3) program coherence 4) technical resources 5) principal leadership. The 5 components of school capacity cannot independently exist; each requires the construction of scaffolding from a common foundation. The development and improvement of each component requires involvement and contributions from the entire professional community, one that has been established from a common need working towards a common purpose. Although this is supported in the literature, there is a need to explore the most effective and efficient ways of introducing reforms and presenting challenges to the learning community so that a high participation rate is achieved. 'Evidence suggests that lateral capacity building works best when it has a clear purpose and a means of measuring whether progress is being made in achieving the purpose and a clear evidence based definition of best practise to inform action' (Schiller 1991)

Building capacity needs to occur laterally, however this does not imply superficially, but rather quite the opposite. There needs to be a profound level of development in each branch that constitutes school capacity. 'In Britain, the National Grid for Learning (NGfL) project has recognized that achieving its long term goal of fully integrating use of ICTs into all aspects of the school system will require a cultural shift in the way schools approach ICTs' (Otto & Albion 2002) School communities who are attempting to initiate ICT reforms need to strategically map pathways best suited to their school's learning environment, to the available infrastructures and to the culture and nature of the school's community. The development of new productive pedagogies and relationships needs to be encouraged supported and challenged to achieve progress and sustainable reforms in ICT. Literature has not identified

decision-making processes and structures that already exist in the schools that are on their way to, or have already experienced a high level of transformative ICT integration. Accessing this information and analysing successful decision-making approaches can be used to help leadership devise decision-making models that can be adapted and modified to suit the needs of the learning community.

ICT Capacity

Some of the influencing factors that may impact on the success of the ICT integration process, including the building of ICT capacity, is the level of understanding leaders have of:

- Related ICT pedagogies,
- The future role of ICT in education and
- Their own efficacy in utilizing ICTs.

The possible consequences that may arise because of this include:

- Inadequate planning and direction
- Inadequate support structures and
- The initiation of incoherent and unsustainable reforms.

In addition 'the application of ICT in the educational process presents a particular challenge to educational leadership from at least three sources a) not all educational leaders are fully versed in the use of educational technologies. b) The successful application of ICT presents new challenges and c) educational use of ICT is a continually developing process' (Schoney, 2002). This reinforces the need for policy makers and educational leaders to have access to current, relevant data that can provide insights into attitudes towards ICT and possibly also expose stages of progression in ICT integration in the different contexts, at the individual, school and systemic level. This information is valuable particularly for those planning and organising training and development programs and for those responsible for the allocation of ICT budgets. It also highlights the importance of providing accessible support structures for educational leaders not only at the initial phase of ICT integration, but throughout the process. If we agree that ICT integration is a progressive process then the support offered should also be of the same nature. Continued research can further contribute to our understanding of the issues associated with innovative ICT integration, while possibly providing practical achievable solutions.

Educational leaders need to build an understanding and appreciation of all that needs to be addressed if communities are to build multifaceted ICT capacities. In some instances educational communities believe that building ICT capacity simply implies the building of ICT infrastructure in providing hardware, software and possibly some access to a technician. A US research 'Professional Development: a link to a better learning' referred to in Learning for the Knowledge Society (2000) indicated that at the time of publication 'US schools spend 5% of their technology budgets on professional development for IT. The report suggests that major change will not occur until this portion increases to 30%.' Building ICT capacity encompasses not only the provision of ICT but also the provision for training in order for educators to improve their ICT skills, and more importantly to know how to incorporate ICT in their learning programs so that both the learning and teaching is transformed and utilizes the full potential of ICTs. This will help ensure that students will have the skills to be creative knowledge producers and critical information users. A concerted effort must be made to 'link technology and educational objectives. Training in technology must have a pedagogical focus' (Making Better Connections 2002). It is via the means of research that the transformative integration process can be an informed, relevant and achievable process that permanently alters teaching and learning practices, policies and beliefs to satisfy the learning requirements of students. The many components that need consideration in the building of ICT capacities can be quite daunting for educational leaders. How do leaders prioritize

identified needs? How should funding be allocated in the area of ICT? The importance of being informed quickly becomes obvious.

Summary

If change is a constant in the world of education then building capacity at all levels and across all domains may provide some of the solutions to the problem of maintaining and sustaining reforms. However in the fast paced world of technology it is easy to focus on and make building resource capacity the main priority, specifically the hardware and infrastructure of ICT. However, does this reflect a very shallow attempt at building capacity, resulting in ICT integration that is retrofitted into traditional pedagogies? If we become proficient at developing one strand needed for the integration of ICT, e.g. resource capacity, is the reform sustainable? Research and literature shows us it is not. (Walsh 2002; November 2000) Leaders need to highlight the connection between the developments of all the capacities. Building leadership, change, ICT and school capacity needs to be tackled on parallel footing. This includes financially investing in all levels of capacity building, allocating time for training and development, allowing time and allocating funds for maintaining the resources and updating infrastructures all the while revisiting the common goals and the identified purpose for initiating the reforms.

ICT has the potential to individualize student learning and revolutionise the way educational communities exist, function and relate to each other. With this amount of potential, ICT deserves to be an ongoing focus in our educational institutions and of government policies. Educational leaders, policy makers, governments and learning communities need to develop visions, combine efforts and pool resources in order to build the necessary capacities to support transformative ICT integration. 'To facilitate coherent, sustainable, and scalable educational reform, studies of how these dimensions of innovation can provide mutual reinforcement are vital' (Dede 1999). It is essential for educational leadership to have the understanding and the skills both pedagogically and technically. Leaders need to present a coordinated, aligned and holistic approach to building relationships, capacities and competencies that will support and guide learning communities to confidently and coherently integrate and utilize ICTs in the 21st century.

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