

Understanding Teacher Mindsets: IT and Change in Hong Kong Schools

Robert Fox

Faculty of Education, The University of Hong Kong, Pokfulam Road
Hong Kong, Special Administrative Region of the People's Republic of China
Tel: +852-2859 8014
Fax: +852-2517 7194
bobfox@hku.hk

James Henri

Faculty of Education, The University of Hong Kong, Pokfulam Road
Hong Kong, Special Administrative Region of the People's Republic of China
Tel: +852-2859 2849
Fax: +852-2517 7194
james@cite.hku.hk

ABSTRACT

In 1998, the Hong Kong government introduced a new policy to use information technology (IT) as a “catalyst” for change in classroom practices. The desired effect was to create a shift from a predominantly teacher-centred approach to more learner-centred teaching. This investigation explores the impact of IT on teaching practices in Hong Kong schools from the perspective of teachers, through the collection of data from surveys and reports into individual school practices, group discussions and follow-up individual interviews. The data was analysed using Fullan’s 2001 framework for understanding leadership within a culture of change. This framework was chosen to facilitate a better understanding of the problems facing classroom teachers. The analysis revealed that while the teachers in this study had indeed taken up the challenge to use IT in their teaching, their practices were little changed. IT was used mainly to support the existing teacher-centred approach. This study identified that the lack of clear and systematic leadership support, the inflexibility of the curriculum and assessment processes, time constraints, and limited appropriate professional development were the main reasons for the restricted impact of IT on the teachers’ practices in the classroom.

Keywords

Teacher development, IT and teacher understandings and practices, Change in schools

Introduction

This paper explores the use of information technology (IT) in classrooms and teacher readiness to use IT to take up the challenge to use IT as a catalyst for change and reform in education. Through a study of primary and secondary school teachers, this study aims to reveal the degree of success in the implementation of the policy at the end of the five year period (1998-2003) and discusses the factors that need to be taken into account before significant change can occur. The study identifies enabling factors and inhibitors of change as perceived by teachers who were technically equipped to affect change. Fullan’s model was chosen as the conceptual framework that would enable the researchers to understand the success or failure of the Hong Kong IT initiative. Teachers involved in this study were taking a masters course in IT in education. They identified their present uses of IT in the classroom and offered a vision of where IT could be used to support student learning. They were asked how best their schools could move forward to take up the challenge laid down by the Hong Kong government to use IT as a “catalyst” to change from a predominantly teacher-centred approach to a more learner-centred approach (EMB, 1998). All references in this article are from the perspective of the teachers. In the study, this research examines teacher readiness and their ability to take up the challenge outlined above by the government. It explores the pressures teachers face that impede making significant changes in their work practices. An assumption embedded in the government policy (EMB, 1998) was that IT could act as a catalyst for change in classroom practices; that the use of IT *per se* is good for education; that IT without other major changes and substantial support can lead to significant change in education. In this paper we argue that without significant changes and incentives in other areas of education, for example curriculum reform, changes to the examination system, major staff development initiatives, this change is unlikely to happen and that the use of IT in classrooms alone will not effect the desired change.

In 1998 “HK\$B3.05 (about US\$M391)” was made available by the new government in Hong Kong to equip schools with hardware and software, to provide IT infrastructure and technical support as well as five years of

technical competency training for teachers (Plomp et al. 2003, p. 25). The initiative reflected the government's perception that the adoption of IT into the education system would be the "catalyst" for a much needed paradigm shift "from a largely text-book based, teacher centred approach to a more interactive and learner-centred approach" (EMB, 1998, p.1). This assumption was in line with IT and education reform agendas elsewhere in much of the industrialised world (e.g., DFEE, UK, 1997; MOE, Singapore, 2000; Ministerio de Educación, Republica de Chile, 1998; MOE, Research, and Church Affairs, Norway, 2000). These reform agendas are all concerned with the adoption and use of IT in schools to increase learning opportunities and student motivation and achievement.

According to Cuban (2001) these kinds of educational reform agendas have three distinct goals for the infusion of IT into education:

Goal 1. Make schools more efficient and productive than they currently are. ... Goal 2. Transform teaching and learning into an engaging and active process connected to real life. ... Goal 3. Prepare the current generation of young people for the future workplace (pp.13-15).

Becker (2001) conducted a school-based study where he highlighted the limitations of teacher and student uptake of IT for educational purposes. He cited existing limitations on appropriate staff development as a primary obstacle to any meaningful change in educational practices as a result of introducing IT into schools. Despite the findings in studies such as those of Cuban and Becker pressure on schools to computerise and join the IT revolution continued and continues to accelerate. There appears to be a strong belief internationally as well as locally in Hong Kong that IT wields a kind of magic and once installed it will transform an education system from a cash strapped, overstretched, transmission mode ugly duckling into the white swan of cost effective, student centred mass education.

International studies into successful IT adoption in schools (e.g. Rowand, 2000; Williams; 2000; Fox, 2003; Ofsted, 2004) tell us that teachers need considerable additional support to make significant changes in their roles and pedagogic work practices and that IT by itself plays a very minor role in transforming teachers and teaching approaches in schools. It is not enough to provide hardware and software, technical support, Internet connections, technical training programs for teachers and students (Pelgrum & Law, 2003; Yuen, Law, & Fox, 2004; Trinidad & Pearson, 2005). Successful integration of IT into the classroom must involve many factors including the integration of and interrelation between government policy, individual institutional vision, history and established culture, teaching philosophy and approaches, curriculum and examination issues, restrictions and limitations, change management strategies, community support and practices of individuals, and teacher-student motivation and abilities and most significantly, clear and committed leadership at all levels.

Regional context and IT initiatives

The injection of funds into the Hong Kong education system followed on from similar initiatives in the region, notably Singapore, which launched a five-year master plan in 1997. In the same year Hong Kong's fledgling government unfolded its own initiative which the new Chief Executive announced in his first policy address:

We will launch a five-year IT education strategy to promote the use of IT to enhance teaching and learning. ... Within five years, we are aiming to have teaching in at least 25% of the curriculum supported through IT. Within ten years, we aim to see IT being applied comprehensively in school life, and all our teachers and Secondary 5 graduates being able to work competently with IT tools (Tung, 1997, paras 46-47).

This address signified a commitment to IT in education based on the assumption of the power of IT to play a dominant role in effecting educational change and reform. In the five years since the injection of funding, money has been spent on the installation of multimedia laboratories, computers, technical staff support, infrastructure and networking within schools and to the Internet, the development of educational software and technical programs for teachers. The stage is set for educational change; so what has happened in Hong Kong schools?

Regional research into IT in education

Cultural context is an important issue for reformers and the work of Ladao (1999) and Kwo (2000) provide a useful lens into the Hong Kong context through their discussion of the "small potato mentality". The notion of

“small potato” describes the passive role of the teacher who identifies her role as limited to classroom instruction and staffroom marking. Kwo (2000) argues that the result of this perceived passive role on the part of the teachers, is a lack of participation in policy making outside the classroom. Consequently teacher influence beyond individual classrooms is limited as is their recognition of the need for broader professional development.

Effecting change in the way people do things and in particular, in the way teachers teach, takes time (Fullan, 2001). Various longitudinal studies, for example ACOT’s report on ten years of research (1995), note that teachers normally go through stages in the change process and likewise with the uptake of new technology. The main stages identified by the ACOT study are outlined below:

1. Entry - learn the basics of using the new technology
2. Adoption - use of new technology to support traditional instruction eg replace OHP and blackboard with PowerPoint instruction
3. Adaptation - integrate new technology into traditional classroom practice. Here, they often focus on increased student productivity and engagement by using word processors, spreadsheet and graphics tools
4. Appropriation - focus on cooperation, project-based and interdisciplinary work - incorporating technology as needed and as one of many tools
5. Invention – discover new uses for technology tools for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies (ACOT, 1995, p. 16).

The ACOT study notes that this journey through the various stages “is enhanced when teachers and students have unlimited access to technology in the classroom and are able to look at different approaches to teaching and learning” (Newhouse, Trinidad & Clarkson, 2002, p.23). In Hong Kong, teachers and students certainly have more access to technology now than ever before, but are they able to adopt different approaches to teaching and learning – the hoped for shift that was the basis for the government initiatives (EMB, 1998)?

Law et al. (2001) reviewed the first few years of the HKSAR Government initiatives for the integration of IT into education. This study found that most teachers in Hong Kong perceived their role as providers of knowledge. Few saw themselves as people who help their students to identify their own knowledge needs and to search for and evaluate information for themselves as advocated by the vision of the Government. Law et al. (ibid) found that although there was no noticeable change in teaching practice across the general population of Hong Kong schools, innovative pedagogies had successfully emerged in some schools. And further that the innovative pedagogical practices found in Hong Kong were on a par with similar practices that were very much valued elsewhere in the world as identified later by Kozma (2003). Law et al. (ibid) found that the emergence of such innovative practices was more to do with strong leadership within schools, where principals have a clear vision for the role of IT in their schools than solely with the presence of IT in the schools.

Lam and Lee’s (2000) research into Hong Kong schools also found that IT was predominantly used simply to transmit information via PowerPoint as an alternative to the overhead projector, to prepare lesson materials and for school administration purposes. Clearly at the time that this and Law et al.’s studies were conducted, the teachers in the study could be seen as predominantly reaching Stage 2 of the ACOT (1995) stages of change in the uptake of new technology, outlined previously in this article.

Methodology; participants and context of the study

The school teachers involved in this study were all Cantonese speakers, undertaking the Master of Science in Information Technology in Education (MSc[ITE]) in the Faculty of Education at the University of Hong Kong. Their reasons for undertaking this course were varied, but mainly they were concerned with finding out how IT could be used to enhance teaching and learning and how to manage IT for sustainable development within their schools.

The MSc[ITE] course itself, is designed to meet the needs of those in the educational community, who are involved in IT implementation and use. The course aims to enable participants to become critically informed about IT issues and practices in education and to prepare teachers and educators to design, develop, evaluate, implement, and manage the use of IT at various educational levels and settings. The course offers an opportunity for those who seek to develop leadership capacities in the use of IT in education to pursue advanced study in the field of IT in education and provides a comprehensive introduction to cultural, administrative and technological implications of new technologies *in* and *for* education. The course is part-time study and offers a flexible modular structure enabling participants to progress according to their own pace, while still teaching in their schools.

An assumption made in this study was that, those who participate in an IT in education masters program are likely to hold a positive attitude towards the use of IT in education. It was not assumed, however, that course participants would necessarily see the need to do things differently in teaching and learning in order to meet the government's challenge to use IT as a catalyst for the educational reform agenda.

Teachers were asked in class to identify current practices in their schools as well as their own use of IT in the classroom. They were asked to describe examples of their experiences and to share success stories with using IT in their schools to support learning, where they felt that learning was advanced through the use of IT. Teachers were then asked to upload their responses to an online course room and use these comments as a basis to discuss similarities and differences between their schools and individual views and experiences. A number of classes were involved in undertaking this activity in 2001 and 2002 and a total of over 200 teachers took part.

Teachers were then selected for interviews based on sampling a spectrum of experiences and positions in schools. In particular age, gender, years of teaching experience and school responsibilities. Initially interviews were conducted in English to gain insights into the participants' experiences and views of the role of IT in schools. Although the interviews did highlight some issues that built on data collected from the online teacher comments, the responses were considered rather superficial in nature. The researchers felt that more in-depth discussions were necessary to elicit subtle and more deep-seated concerns about IT in education and to build on data already collected. A research assistant was therefore employed to conduct another round of interviews in Cantonese, the first language of the participating teachers. In total, 36 teachers were interviewed.

Findings and discussion

In broad terms the accounts given by the teachers reflected the first four ACOT (1995) stages of progress namely: entry, adoption, adaptation and appropriation outlined previously. However the great majority of accounts from teachers related to the earlier stages of technology adoption, indicating that although these teachers were taking a masters level course in IT in education, most had limited experience of using IT up to this stage in their professional lives.

Most of the participating teachers concurred that changes, when they were noticeable, were mostly limited to lower secondary school and primary school classes. Tight curriculum requirements, lessons of typically 33 minutes, and examination pressures gave little time to try out new ideas during later secondary school classes. The teachers felt constrained by what they referred to as the overfilled curriculum and believed that curriculum change needed to occur in order to make room for new opportunities and to explore different ways of working. They felt their priority was to ensure that their students attained the academic level required to gain a good pass in the existing examination system. The washback effect of the current examination system created a tidal wave of pressures for rote learning from Grade Three to Six in primary school, to meet the intensive competition to get into the right secondary school, followed by two sets of exams at secondary level, one at the end of Form Five and another at the end of Form Seven for those wishing to enter university. There was agreement that unless or until the examination system was changed in Hong Kong, teachers would be pressured by the community, the principal, parents and students to focus on helping students achieve good examination results. As one teacher remarked "... if you cannot make good use of IT to help improve student examination results, it is better not to use IT at all."

These findings suggest that a shift to learner centred approaches to teaching and learning is dependent not on the introduction of IT but on changing the curriculum and the exam orientated educational culture that still exists here. Curriculum and assessment reform in Hong Kong is slowly taking place, but it is very much a top down process.

Key issues discussed at length with teachers included their views and understandings of their school's development and future planning. On the issue of their school's development, few saw this as an important concern for them. "It is up to the principal to define the school's vision and mission and to then inform us of what direction he wants us to go" was a typical comment. With regard to the issue of leadership, the majority of teachers identified themselves as "small potatoes" and believed that leadership was the role of the principal only. Nevertheless, the participating teachers strongly suggested that principals who were perceived by their staff as "strong leaders" with a clear vision for the school and a good understanding of how to integrate IT into the curriculum were generally enthusiastically followed. Unfortunately, of the 36 teachers interviewed only four considered that their principal had such a vision or such an understanding of how IT could be successfully integrated into the school and into the curriculum.

Making sense of where we are and moving forward

The participants in the study identified the “small potato-large potato” divide as critical to school change and school improvement. They were small potatoes; their principals were large potatoes. This divide was reinforced by a few respondents who indicated that if they were to become principals they would do things quite differently than their current principals who they felt, did not really understand technology and its relevance to the government’s proposed shift to more learner centred activities. These respondents felt that they could not lead significant change from their position as “small potatoes”.

The challenge for the researchers was to find a way of understanding why a change mindset was uncommon even among these respondents who had the technical expertise, had been exposed to diverse pedagogical practices, had taken courses in educational leadership and change, and were living and working in a society that was very actively promoting a culture of change. What were the shortcomings and how could they be identified?

The researchers turned to the work of Fullan and in particular to his text, *Leading in a culture of change* (2001) in an attempt to unpack the key ingredients that underscore a change mindset. Fullan has articulated a framework for leadership that underpins the adoption of change (Fig 1.1) and the researchers were interested to see whether the mapping of this framework to the interview data would provide a clue or clues to explain the passive attitude towards individual and personal change that was exposed by the data.

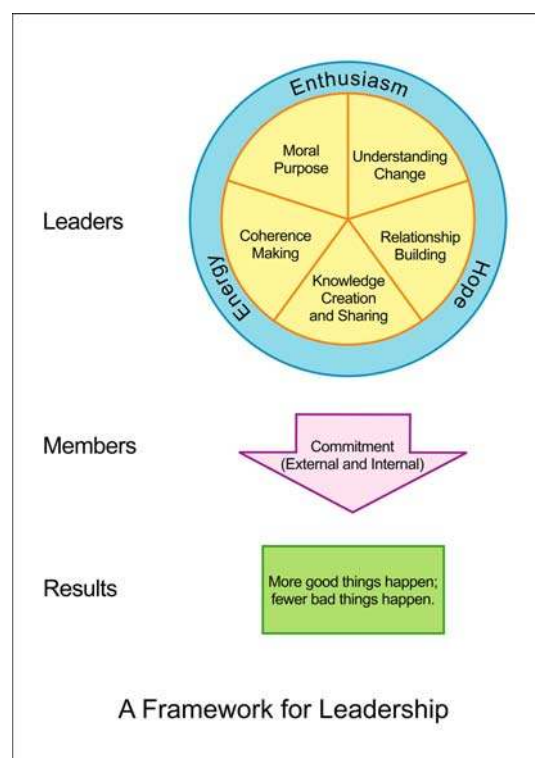


Figure 1. A framework for leadership, adapted from Fullan (2001)

Understanding the framework

The outer ring comprises three forces namely: enthusiasm, energy and hope (Fig 1.1). These elements are the fuel that enables activation of the mindsets that are the heart of the framework: moral purpose, coherence making, knowledge creation and sharing, and relationship building.

There is ample evidence that the participants had enthusiasm and energy. This is demonstrated from the interview data and from their lifestyles. Evidence of hope is more problematic. A small minority of respondents indicated that their principals understood the need for change, realized that harnessing new pedagogies to technology was important, and were moving forward. The majority of respondents, however, saw the inability of the principal to grapple with the change issues coupled with his/her big potato status to be critical impediments

to change. What hope they had was invested in the unlikely possibility that a new, enlightened principal could lead change.

Moral purpose is about means and ends. Teachers must see that it is important that they make a difference in the present and future lives of their students. They must also be interested in the adoption of appropriate, fair and ethical means to achieve these ends. Teachers cannot put on moral purpose each morning as they arrive at school. Moral purpose is a central component of professional (and even personal) practice. It is what allows teachers to see the preferred and probable future and to assemble resources to equip students to adapt to that future.

While some respondents demonstrated some levels of personal moral purpose, there was a distinct lack of application of that to the corporate purpose and future of schooling. This deficit is explained in part by the “small potato” mentality that promotes a view of the world that a mere classroom teacher does not need to consider such matters. The teacher’s role is perceived to be largely instrumental in that they must follow the will of the government, the Education and Manpower Bureau (EMB), and the principal. Teaching is perceived as an occupation rather than a profession. The implementation of IT is discussed as a series of challenges rather than part of a personal vision. Examples of good IT practice are often not personal accounts but rather grapevine accounts attributed to colleagues. The idea of professional responsibility is subservient to the will of the principal even when teachers recognise that the principal is out of step with the directives of the EMB.

Fullan argues that it is essential that leaders understand change. By this he means those who understand change are concerned less about particular innovations and more about a state of mind he calls innovativeness. Understanding change is about equipping teachers with a capacity and commitment to solve complex problems and situations. Understanding change requires an appreciation that the introduction of new materials, behaviours, or beliefs, will generate levels of anxiety and even chaos and will almost certainly lead to a dip in performance before the value of the innovation can be seen and evaluated.

Despite the fact that the respondents had taken modules in leadership and change in the masters course, they did not articulate an understanding of change as described by Fullan. Indeed while the barriers to change were clearly understood, and while the frustrations of implementation had been experienced, there was a general lack of understanding of the role that they could play as an agent of school change. (This was so even though some respondents were able to point to changes that they had introduced within their classrooms.)

The data reveals that the respondents believe that building relationships is important and they indicate that this is a feature of their schools. Fostering a caring culture is a key objective both among teachers and among students. All schools have small groupings where bonding is a hallmark. However, respondents indicated that relationship building was often task orientated and bonds were formed out of necessity to produce a desired result rather than out of a desire to get to know a larger circle of colleagues. Bonding was most likely to occur within subject teams or among teachers with similar responsibilities. Sometimes relationships were skin deep and power plays often broke out between competing groups. Indeed some respondents indicated that they tended to ignore other groups, and even individuals, because that was the easiest way to avoid messy disputes and ongoing conflicts. There was scant evidence that schools adopted a strategic approach to team building.

Respondents used the term “no sharing culture” to explain the paucity of creative solutions to knowledge creation and sharing. That is not to say that evidence of sharing was totally lacking, however, this tended to be couched in terms of personal friendship, and ad hoc in nature, rather than systematic and extensive. Heavy workloads and therefore lack of time were often proffered as reasons for a lack of collaboration even though the application of IT could have facilitated knowledge sharing.

A culture of change requires constant choices among several possible innovations and Fullan argues that leadership demands that the test of coherence be applied as the determining factor in making choices. Schooling can be characterised by episodic, piecemeal, and disconnected projects and plans that compete for attention and for resources. Leadership is about making sense of these disturbing ideas, projects and plans, firstly through the lens of moral purpose and then through the lens of coherence.

Purpose is what binds the ethical elements of moral purpose with the decision-making tools that are associated with coherence making. But it seems the work-world of these respondents is only indirectly determined by purpose. The two factors that determine their choices are: urgency and student affairs. The idea of coherence does not seem to be a factor in decision-making. For example one common response when asked how the teacher prioritised her work stated: “I follow the principal’s instructions. I do what I am asked”.

Framework and amplification

The Fullan framework does illuminate some of the cultural factors that make the application of theory from one culture to another problematic. While western cultures purport to be built around open communication and exchange of information, this is certainly not a feature of the culture of Hong Kong or of China generally. Here, the culture is much more attuned to respecting age and the wisdom of age. The question arises then, is leadership in this culture to be understood differently than it is by Fullan? Is the leader's toolkit different or must leaders break out of the cultural norms?

The framework certainly provides an excellent set of lenses that can be employed to better understand the obstacles that confront reformers and the diffusion of innovations throughout schools in Hong Kong. The reform movement is about matching the world trend to identify schools as places that equip students to learn how to learn and where students are guided to become life-long problem solvers. But the reform has been top-down and has ignored the possibility that teachers themselves are products of an educational culture which did not equip them to become independent decision makers. Or perhaps reform is only possible if teachers adopt reforms unquestioningly because they are required so to do.

The evidence from this study is that these teachers, despite technical competence, are not equipped to lead. They do not hold a consistent view about what it means to be a teacher, nor do they have the means to judge whether or not a new innovation compliments the existing culture. Indeed teachers protect themselves and are protected from such matters which are seen to be entirely the domain of the principal. Teachers do not therefore exhibit personal ownership of what happens at school or where the school is going; that is someone else's area of expertise and responsibility. Teachers are very much orientated towards student success (as measured by examination results) and they will therefore rather blindly adopt any gimmick that may increase student motivation, and consequently, student success—even if only in the short term.

Teacher involvement beyond the classroom is likely to occur only on the request of the principal. This ensures that teachers have fragments of knowledge about schools and they are therefore unable to discern linkages that could decrease workloads and provide synergies for consistent and long lasting innovative practice.

Paradox of cross cultural implementation

The authors suggest that this small study provides some evidence to support the argument that innovations from one culture cannot be easily transplanted into another culture and that innovations that can be linked to existing norms are more likely to succeed. In the case of Hong Kong the educational reforms have generally mirrored reforms in the "western world" and it has been assumed that such transplantation is possible and desirable. Western educational reform has embraced the devolution of authority to the school level and this translates into forms of democratic action among teachers to form a consistent mission and adoption of selected interventions. In the western world the principal delegates responsibility to enable fusion of ownership and it could be argued that other reforms are dependent upon this. Delegation by principals is not a common practice within Hong Kong schools and this creates a significant challenge for teacher-lead reform.

Addressing this paradox is perhaps the key to success. Addressing the day-to-day concerns of the small potatoes; heavy workloads, high student-teacher ratios, and limited opportunity for collaboration, in tandem with other reforms would create the time and opportunity for the reflective practices that are fundamental to changing traditional mindsets.

Conclusion and recommendations

This small scale study indicates that very limited change has occurred in Hong Kong schools due to the introduction of IT, in terms of moving from a teacher centred approach to a more learner centred one as outlined in the government's plan (EMB, 1998). This study concludes that the community cannot realistically expect major pedagogical change to occur in Hong Kong schools unless a more holistic and systematic approach to facilitate change is adopted. In particular, the reform needs to involve changes in the curriculum, assessment and the professional development of staff (not limited to just technical training in how to use new technology). There needs to be administrative support as well as incentives for teachers to engage in the change process. From the principals down, all staff at all levels should be given a stakehold and a leadership role in the reform process in schools as well as incentives for stronger partnerships between schools, homes and the community. Any

sustainable IT implementation should therefore only be seen in the context of holistic and systematic reform and unless other changes are coordinated with the introduction of IT in schools, the expectations for reform will fail.

Teachers “believe” that they are small potatoes, and therefore they are small potatoes. Teachers are extremely busy, often overloaded with administrative trivia and other busy-work. They do not have sufficient time for the reflective practices that facilitate the development of some of Fullan’s key measures of the change agent. They have little time or opportunity for communication and relationship building let alone opportunity for deliberating moral purpose or for identifying coherence across practices. Furthermore, the present practices are reinforced by a system that still imposes examinations as the key measure of learning.

Teachers who want to empower their students, in addition to ensuring that they obtain good grades, must provide learning space, both physical and mental, in which they can mature. Caught in the maelstrom of everyday school, Hong Kong teachers do well to survive, let alone provide leadership. Government and school authorities must find ways of providing time for teachers to engage in deep reflection. Without this time teachers cannot harness the skills that they have learned as part of their ongoing professional development.

This study tells us that a good conceptual model enables understanding across cultural and socio-political boundaries. The study also warns us that transplanting educational reforms across these same boundaries requires extensive preparation and understanding of the broader school context. Providing teachers with technical competence for change, while necessary, is not sufficient to achieve change. Understanding the culture and energising that culture to accommodate change is also a necessary condition for successful implementation. This study has also reinforced our understanding that change requires time. That is, it requires a length of time, but more than that it requires ongoing “space” for reflection and discussion.

Acknowledgements

This project was funded by the University of Hong Kong Research Initiation Grants #10203556.

References

- ACOT (1995). *Changing the conversations about teaching, learning and technology: a report on the 10 years of ACOT research*, Frenchs Forest, NSW: Apple Computer Pty Ltd.
- Becker, H. (2001, April). How are teachers using computers in instruction? *Paper presented at the meeting of the American Educational Research Association, Center for Research on Information Technology & Organizations, University of California, Irvine*, retrieved January 7, 2005 from <http://www.crito.uci.edu/tlc/FINDINGS/special3/>.
- Cuban, L. (2001). *Oversold & underused: Computers in the classroom*, Cambridge, Mass.: Harvard University Press.
- Department for Education and Employment (1997). *Connecting the Learning Society: National Grid for Learning [on-line]*, retrieved November 22, 2004 from <http://www.dfes.gov.uk/consultations/conResults.cfm?consultationId=1104>.
- Education and Manpower Bureau (1998). *Information Technology for Learning in a New Era, Five-Year Strategy 1998/1998 to 2002/03*. Printing Department: Hong Kong Government.
- Fox, R. (2003). Technology and change. An examination of staff beliefs and use of ICT. *Staff and Educational Development International*, 7 (1), 85-94.
- Fullan, M. (2001). *Leading in a culture of change*, San Francisco: Jossey-Bass.
- Kwo, O. (2000). Hierarchy and the small-potato mentality: Constraints and opportunities for teacher leadership. *Paper presented to 13th International Congress for School Effectiveness and Improvement*, January 4-8, 2000, Hong Kong.

- Kozma, R. B. (Ed.) (2003). *Technology innovation and educational change: a global perspective*, Danvers: ISTE.
- Ladao, M. (1999). Problems inhibiting teacher development. *Paper presented to the Symposium on Creating a Changing Force for Educational Improvement*, November, Hong Kong.
- Lam, C. C., & Lee, F. L. (2000). A caveat to researchers on the implementation of information technology. *Educational Research Journal*, 15 (2), 241-256.
- Law, N., Yuen, H. K., Ki, W. W., Li, S. C., & Lee, Y. (1999). *Second International Information Technology in Education Study: Hong Kong SAR Report*, Hong Kong: Centre for Information Technology in School and Teacher Education, The University of Hong Kong.
- Law, N., Yuen, H. K., Ki, W. W., Li, S. C., Lee, Y., & Chow, Y. (2000). (Eds.). *Changing Classroom and Changing Schools: Study of Good Practices in Using ICT in Hong Kong Schools*, Hong Kong: Centre for Information Technology in School and Teacher Education, The University of Hong Kong.
- Law, N., Yuen, H. K., & Wong, K. C. (2001). *Preliminary Review and Evaluation of IT in Education Initiatives*, Research report submitted to the Education Department of the Hong Kong SAR Government, 214pp. (Publication No. : 69868).
- Ministerio de Educación, Republica de Chile (1998). *Reform in progress: Quality education for all*, Santiago, Chile: Ministerio de Educación.
- Ministry of Education, Research, and Church Affairs, Norway (2000). *ICT in Norwegian Education: Plan for 2000-2003*, retrieved January 7, 2005 from <http://odin.dep.no/archive/kufbilder/01/03/IKTiu005.pdf>.
- Ministry of Education, Singapore (2000). *Mission with a passion: Making a difference*, Singapore: Ministry of Education.
- Newhouse, C. P., Trinidad, S., & Clarkson, B. (2002). *Quality pedagogy and effective learning with information and communication technology (ICT): a review of literature*, retrieved April 2, 2005 from <http://www.eddept.wa.edu.au/cmis/eval/downloads/pd/litreview.pdf>.
- Ofsted (2004). *Impact of government initiatives five years on*, Ofsted publication No. 2050, Office for Standards in Education, UK, retrieved January, 2005, from <http://www.ofsted.gov.uk/publications/index.cfm?fuseaction=pubs.displayfile&id=3652&type=pdf>.
- Rowland, C. (2000). *Teacher use of computers and the Internet in public schools*, National Center for Educational Statistics, U.S. Department of Education, retrieved March 27, 2004 from <http://nces.ed.gov/pubs2000/2000090.pdf>.
- Pelgrum, W., & Law, N. (2003). *ICT in education around the world: trends, problems and prospects*, Paris: UNESCO: International Institute for Educational Planning.
- Plomp, T., Anderson, R. E., Law, N., & Quale, A. (Eds.). (2003). *Cross-national information and communication technology policies and practices in education*, Greenwich: Information Age Publishing.
- Trinidad, S., & Pearson, J. (2005). *Using information and communication technologies in education. Effective leadership, change and models of good practice*, Singapore: Pearson Prentice Hall.
- Tung, C. H. (1997). *Building Hong Kong for a new era*, Address by the Chief Executive at the Provisional Legislative Council Meeting on 8 October, 1997. Printing Department: Hong Kong Government.
- Williams, C. (2000). *Internet access in U.S. public schools and classrooms: 1994-99*, National Center for Educational Statistics, U.S. Department of Education, retrieved January 7, 2005 from <http://nces.ed.gov/pubs2000/2000086.pdf>.
- Yuen, H. K., Fox, B., & Law, N. (2004). Curriculum innovations and multi-level e-leadership requirements: putting research into practice, *Asia-Pacific Cybereducation Journal*, 1 (1), 1-12.