ICT PD 4 Me!

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Abstract: Researchers and practitioners recognise the crucial links between ICT Access and ICT Ability in promoting ICT Use. This paper is the third in a series exploring this link, and concentrates specifically on approaches to ICT Ability. This paper considers literature and research relating to ICT PD from a variety of sources and countries. Building on a model proposed at the ITEM2002 conference, the paper explores research conducted in a selection of schools in England, and then discusses one implementation of ICT PD programmes in Australia. Results of this implementation are discussed, concluding that it may be a valuable model for other schools seeking to leverage ICT use for educational innovation.

Keywords: School information systems, professional development, educational management, information technology.

1. INTRODUCTION

In the past two decades during which the phenomenon of information and communications technologies (ICT) has burst onto the educational scene, many commentators have noted the often haphazard and ad hoc nature of ICT assimilation in schools. The road from 'initial adoption' to 'embedded use' is littered with war stories of hardware obsolescence, software incompatibility, systemic underinvestment and lack of user competence (Cuban 2000, Bechervaise & Chomley 2003). It has been, and continues to be, a journey of 'trial and error' to determine what models are effective in embedding ICT into teaching, learning and administration.

This paper provides some perspectives on the use of staff professional development to embed ICT use into a school setting. It builds on previous work by the author as well as other ITEM commentators, linking theoretical models, survey and case study research, and empirical evidence. Section 2 describes an ICT Competence model initially developed in 2002. In contrast, Section 3 reviews results from a survey conducted in the UK in 2003,

highlighting the issue of ICT competence. Section 4 presents a case study from one Australian school. Empirical evidence from this is analysed in Section 5, showing the effectiveness of the PD programme. Sections 6 and 7 conclude by demonstrating that there are genuine and measurable improvements in ICT use through a robust ICT PD programme and strategy.

2.   AN ICT COMPETENCES MODEL

It is generally acknowledged in the literature that getting ICT professional development 'right' is difficult to achieve (Selwood et al 2000, Visscher & Brandhorst 2001). At the same time, despite the difficulties, there is also recognition that there are critical links between staff ICT ability and use, and staff ICT ability and student ICT ability (Kennewell et al 2000, Russell et al 2000, NGfL 2002). In 2002 a discussion group was formed at the ITEM conference in Helsinki to consider core competences required for ITEM. In part, this was in response to a recognition that many ICT PD efforts had failed. A key outcome of that discussion group was a proposed competences framework (Selwood et al, 2002). This model identified 36 competences across three dimensions – knowledge domain, organisation level, and stage of growth – as described in the following sections.

2.1   The X Axis: ITEM Knowledge Domains

By deconstructing the ITEM group's basic terms, four core knowledge domains present themselves – information, technology, education and management. ITEM links these four domains inextricably and it is in their interactions that ITEM has its uniqueness, and it is important to distinguish the different competences required in each of these knowledge domains.

2.2   The Y Axis: Organisational Levels – Operational, Tactical, and Strategic

The management process is primarily concerned with decision making. Drawn from the management literature decision making can occur at three different levels operational, tactical, and strategic. Whenever for example, head teachers and governing bodies in a school form a vision of where the school is going, establish aims and objectives, prioritise them and develop a plan for the accomplishment of these objectives, they are involved in strategic decision making. Whenever they are making decisions concerned with the implementation of the school's development plan, their decisions may be considered as tactical. Finally, whenever they have to carry out clear and specific tasks they are making operational decisions. Other authors have considered these organisational levels in terms of the degree of structured thinking, whereby operational decisions are highly structured, tactical decisions are semi-structured and strategic decisions tend to be unstructured.

2.3   The Z Axis – Stages of Growth

This axis reflects the degree of sophistication of the organisation's IT effort, as seen in well-exercised 'stages of growth' theories, including Nolan (1979), Visscher (1991) and Galliers & Sutherland (1991).

Each of these theorists offered a model with certain relevance to the ITEM competence debate. Both the Nolan and Galliers & Sutherland models were perceived as too generic for the ITEM domain, whereas the Visscher model was perceived as being the most relevant. Ultimately, the stage labels used were Initiation, Expansion, and Embedded.

2.4   Advantages of the ITEM Competence Model

The proposed model offered certain advantages, as follows:
- It enables us to map existing policies and programmes, and to investigate goodness of fit of those policies and programmes;
- It enables us to map ITEM competences to existing job descriptions within educational institutions;
- It is platform-independent;
- It is descriptive, as well as prescriptive;
- It helps us in the development of more appropriate policies and programmes for ITEM competences.
- It assists in development of a post-graduate ITEM curriculum;
- It enables the certification of other courses against the criteria noted in these competences.

3.   THE UK SURVEY

In late 2002, as part of a wider study, 1366 school staff responded to questions related to ICT access, ability and use. Results were analysed from Nov 2002 to Feb 2003, according to strata such as School, Region, Age, Phase (Primary, Secondary) and Department. Data were analysed to explore relationships between dependent and independent variables.

3.1 Ability with ICT

In one question, staff were asked to self-assess their current ability with a selection of applications. In a subsequent question, they were asked to nominate their desired level of ability with the same selection of applications. Tables 1 and 2 summarise responses to these questions.

Table 1. Perceived current ability (Where 0 = Non-existent, 3 = Advanced)

ITEM	Primary	Secondary	AVG
Word	2.03	2.16	2.13
Excel	1.27	1.54	1.47
Powerpoint	0.77	0.95	0.90

ITEM	Primary	Secondary	AVG
Access	0.50	0.65	0.61
Publisher	1.00	0.80	0.85
Email	1.82	2.00	1.95
Web Search	1.70	1.88	1.83
Web design	0.19	0.31	0.28
Projectors	0.25	0.44	0.39
Digital Whiteboard	0.43	0.39	0.40

Table 2. Desired future ability (Where 0 = Not Relevant, 3 = Advanced)

ITEM	Primary	Secondary	AVG
Word	2.47	2.54	2.52
Excel	2.01	2.21	2.16
Powerpoint	1.78	1.97	1.92
Access	1.28	1.43	1.39
Publisher	1.80	1.66	1.70
Email	2.27	2.38	2.35
Web Search	2.18	2.29	2.26
Web design	1.01	1.10	1.08
Projectors	0.91	1.21	1.13
Digital Whiteboard	1.42	1.48	1.47

In order to determine 'professional development priorities', the differential between "current" and "desired" was calculated for each application. These priorities were calculated for primary and secondary phases, and are shown in Table 3.

As can be seen from the table, most respondents expressed confidence in their ability with core applications such as word processing, email and internet searching. The main priorities perceived by respondents were for training in presentation-based applications (hardware and software), the clear implication being that they recognised genuine benefit for teaching and learning from these skills.

When asked to identify the factors that were preventing them from making more use of ICT, staff nominated 'Lack of Training' as a major inhibitor (O'Mahony 2004).

Table 3. ICT PD Priorities

	Sample-Wide	Primary	Secondary
Priority	**Application**	**Application**	**Application**
1	Smartboards	Powerpoint	Powerpoint
2	Powerpoint	Smartboards	Smartboards
3	Publisher	Publisher	Publisher
4	Web Design	Web Design	Data Projectors
5	Data Projectors	Microsoft Access	Microsoft Access
6	Microsoft Access	Microsoft Excel	Web Design
7	Microsoft Excel	Data Projectors	Microsoft Excel
8	Web Searching	Web Searching	Web Searching
9	Email	Email	Email
10	Microsoft Word	Microsoft Word	Microsoft Word

4. AN AUSTRALIAN CASE STUDY

4.1 Background

The case study school is an independent day and boarding college for boys in Sydney, Australia. Although initially hesitant to embrace ICT innovations in the early 1990s, the school's management realized in 1994 that a number of 'push' and 'pull' factors were at work which required a whole-school strategy for ICT. After engaging external consultants, the school tabled its first ICT Strategic Plan in late 1995. This plan made provision for an extensive rollout of fibre-optic and category5 cabling throughout the school site, an ongoing programme of investment in end-user hardware and software, a review of curriculum outcomes to incorporate ICT elements, and provision for staff training and support. It is interesting to note the extent to which ICT has become embedded in the school's culture by considering the following comparisons between 1994 and 2004 (Table 4).

In addition to a high level of ICT provision within the school, members of the school community (staff, students and parents) also exhibited high levels of access to ICT outside school. In 2003, 95% of staff reported access to internet and email from home. Students and parents reported high levels of access to computers (97%), and high levels of access to internet and email in the home (89%). These metrics are consistent with similar statistics from other developed countries around the world (Research Machines 2000, DfES 2001, National Statistics 2002, Ofsted 2002).

Table 4. Evolution of ICT in case study school

Dimension	1994	2004
Students	1100	1550
Academic Staff	120	170
Support Staff	50	80
Student Computers	60	450
Student-Computer ratio	1:19	1:3.5
Staff Computers	15	120
(Academic) Staff-Computer ratio	1:8	1:1.5
% Computers with internet access	5%	100%
% students with email accounts	0%	100%
% staff with email accounts	0%	100%
Servers	2	35
ICT Support staff	1	10
Annual ICT spend (as % of total spend)	1%	8%

4.2 ICT Management model

There has been an emerging perception throughout the school that ICT is an enabler, providing increased efficiencies and effectiveness in administration, and adding value to teaching and learning (Kennewell et al 2000, Passey 2002). In educational institutions ICT can become either a bridge or a chasm. ICT can be a bridge in that it has the potential to:

- directly support pedagogical efforts in the teaching and learning context, in terms of delivering educational and applications software to the classroom;
- directly support the backoffice functions of the school;
- indirectly minimize the impact of necessary administrative functions that teachers, students and parents are required to perform.

ICT can be a chasm in the sense that it:

- so frequently falls short of the expectations and overblown promises of suppliers, developers and purchasers;
- is often perceived as a weapon for administrative control, rather than a tool for educational empowerment.

Arising from the school's efforts to embed ICT into its operations is a growing recognition of key factors that enable ICT to flourish, and thus for the school to be more effective in its overall development (Kirkman 2000). These factors form a 6-point model for achieving confident use with ICT. Within the school, this model exists in a specific context, whereby ICT has increasingly become a fulcrum for change in the organisation's culture. In summary, the 6-point-model comprises: policy, executive commitment, ICT resources, professional development, evaluation /appraisal, student learning. Details of this 6-point model are outlined in the following sections.

4.2.1 Curriculum ICT Policy (Strategic)

The school, through its ICT Strategic Plan, makes a clear statement of intent and direction concerning use of ICT in curriculum areas. This is visible in school documentation at senior management level, and is internalised throughout the curriculum (Kennewell et al 2000). "In … successful schools, senior management do more than provide support for the IT Coordinator's policy; rather the IT policy is viewed as emanating from senior management" (ACCAC 1999). ICT policy seeks to articulate well with the school's business and strategic development plans (Yee 2000).

4.2.2 Department Commitment (Tactical)

At the Department level, ICT policies exist which articulate with the wider ICT strategy, and provide necessary detail and context for the respective curriculum area. These policies express the department's commitment to ICT professional development, and specify expectations of ICT use in the classroom, both in terms of minimum hours and ICT-based tasks (Newton 2003, Lambert & Nolan 2003).

4.2.3 ICT Resources

A pre-requisite to success with school ICT is the provision of sufficient, reliable and up-to-date resources (ACCAC 1999). These resources include network infrastructure, workstation and peripheral hardware, software and

human resources. Table 4 (see Section 4.1) indicates the school's investment in resources over a ten year period. Strong project management methodologies have been applied to ensure that the school gains good value for money, recognising that inferior products do more damage than good. Rigorous criteria are used in selecting hardware and software applications, such as ease of integration and ease of use (Stevenson 1997).

4.2.4 Teacher Professional Development

Hiring external trainers has often been the only option for schools but, increasingly, schools are considering appointment of dedicated training staff within the overall ICT function (Watson 2001), as is the case with the subject school (O'Mahony 2002). As well as having ICT resources and policies regarding use of ICT in teaching, learning and administration, the school has implemented a robust and measurable professional development programme (Donnelly 2000, Russell et al 2000, Webb & Downes 2003). This programme has six main components, as described in Section 5.

4.2.5 Staff Appraisal and Review

The appraisal and review process gives crucial feedback for all aspects of the model. To drive home the message concerning the school's commitment to ICT, effective classroom use of ICT is a performance indicator for staff. The reviewer can flag the reviewee's ICT training needs, which is communicated to the training function/coordinator, who organises/delivers the required training. Once completed, confirmation of training is passed back along the chain. As well as providing feedback on staff ability, the appraisal and review process offers the opportunity to flag any issues concerning ICT resourcing or access. These issues, too, are forwarded to the relevant person/function. Collectively, they will assist in the formation of subsequent ICT strategies (Barnes & Greer 2002, Dowling 2003).

4.2.6 Student Learning

The ultimate aim of this model, and in particular the Staff ICT PD programme, is improvement of student learning. Thus, complementary to a Staff ICT skills programme is a cross-curricular student ICT skills programme. Transcending the use of ICT in specific subjects, this provides broad-based exposure to generic ICT skills, including keyboard familiarity, word processing, spreadsheets, presentation graphics, internet searching, critical analysis of web-based data, and 'appropriate ICT use' (NGfL 2002a, NGfL 2002b, Hruskocy et al, 2000).

5.   THE AUSTRALIAN ICT PD STRATEGY

The case study school, through its ICT Training Service, encourages the continuing ICT professional development of all school staff. Services are reviewed regularly to ensure their ongoing relevance to the needs of the school community, and articulate closely with the wider professional development service offered within the school. Components of the ICT PD strategy are as follows:

5.1   ICT PD components

Initial orientation – all new staff to the College are offered an introductory ICT training session as part of their orientation. This session introduces staff to the school network and the wide array of information and communication technologies that are available.

Formal Training – a comprehensive schedule of formal ICT training has been developed. As part of the school's commitment to ICT professional development, normal teaching loads include one period per cycle (fortnight) specifically set aside for ICT training. These PD periods are delivered within the normal timetable. Session topics are negotiated with faculty heads.

E-Learning – the school has purchased site licences for a number of E-learning products. These are available through the network, and can also be accessed remotely. They are self-paced, and are complementary to the formal training sessions noted above.

BITES – "Bits of IT Excellent Stuff" is a series of after-school presentations held in a larger school hall. Visiting speakers present and demonstrate innovative ways of using ICT in teaching and learning. Usually there is one presentation each Term, the evening, open to staff and parents.

Surgeries – in addition to the more formal class-based PD, school IT training staff make themselves available for informal question & answer sessions. These are generally one-on-one, but can also take the form of small-group training.

External Events – throughout the year, a number of external organisations offer a selection of practical workshops, master classes, conferences, demonstrations and exhibitions related to ICT and education. The school budgets for staff participation in these events, with an expectation that participating staff present feedback at a relevant forum.

5.2   ICT PD Survey

In 2004, a survey was conducted among staff to explore the efficacy of the ICT PD strategy. The survey comprised two questionnaires – one administered at the beginning of the school year to provide baseline data, and a second conducted at the end of the year. Both questionnaires had essentially identical questions, thus forming a valid pre-test/post-test model.

The following table shows a summary of results for both questionnaires (Table 5).

Table 5. Questionnaire results (Scale = 1 to 5)

Dimension	Feb-04	Nov-04	change	% diff
Windows	3.57	4.02	0.65	13%
Email	3.28	3.98	0.70	14%
Internet	3.18	3.70	0.52	10%
ICT in Class	2.18	2.50	0.37	7%
Word	3.33	3.71	0.38	8%
Excel	2.66	2.99	0.33	7%
Powerpoint	2.59	3.17	0.58	12%
Marks	3.53	4.11	0.58	12%
Workbench	n/a	1.96		
Training	n/a	3.73		

6. DISCUSSION OF RESULTS

Analysis of the results of the 2004 survey demonstrated a number of things. Firstly, the February responses corroborated the findings of the 2003 UK survey, showing that staff demonstrated a core competence across a range of ICT applications. Secondly, the November responses demonstrated that, through the intervention of the ICT PD strategy, significant improvements were made in ICT competence across these applications. Other observations regarding the impact of the ICT PD strategy includes the following:

- Increased ICT competence has built an expectation among staff for increased ICT access. Thus the school has recognised that increased ICT access and increased ICT competence are linked in an 'expectation spiral'.
- Increased ICT competence has led to increased enthusiasm for ICT use, and also for ICT PD itself, in recognition that it really does make a difference in teaching and learning.
- The school is now incorporating an expectation of ICT competence into its staff promotions policy. Staff must demonstrate successful completion of ICT PD components in order to be considered for internal promotion positions.
- The school's ICT support function has noted a reduction in service calls, directly related to an increase in staff resilience and self-help, brought about by the ICT PD Strategy.

7. CONCLUSION

This paper has brought together research that spans many years and many countries, all linked by the central theme of ICT professional development, and its impact on overall school effectiveness with ICT. From an essentially theoretical starting point, the paper has shown how a specific

ICT PD strategy can be devised and implemented. Unlike some other models of ICT PD that have been attempted through the years, this small-scale strategy has demonstrated genuine improvements in ICT competence, as well as positive outcomes for ICT effectiveness in teaching, learning and administration. It is anticipated that other schools may gain similar improvements by adopting a similar strategy.

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