Managing Technological Effects in Education

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Abstract

The adoption of Information and Communication Technologies (ICT) in educational contexts is often made for pragmatic reasons in the belief that aspects of the educative context may be enriched, controlled, or stabilised for better professional practice. Some implementations are for “follow-the-leader” initiatives, perceived organisation competitive advantages or often uncharted expectation. In reality ICT has many consequences that form a spectrum of possibility for developing educative capacities and a suite of limitations that may have unintended consequences for the best of intentions.

This paper reviews a case study of a school wide implementation of Web based reporting software and evaluates the effects of technology (ICT) in a school culture. The critique reflects on theory, data from participant observation and teacher talk, and the Education Review Office interest in self-reporting schools. Recommendations are made for effective ICT implementation and the holistic consideration of ICT effects.
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INTRODUCTION

Information and communications technology (ICT) have variously contributed to the ways education is done and to the ways the future is being purchased for oncoming generations. Capital investment into ICT by the stakeholders in schooling has been fuelled by a belief that the economy and social sustainability are directly linked to ICT capacities (ERO, 2003, MOE, 2003, etc.). The commitment to ICT capacity development is driven by a multiplicity of motivations and often with little thought for unintended and unintentional consequences. Beliefs regarding the empowering good, the immediate solution and the concert of others saying the same, often over shadow evaluation of the changes to the way education may proceed and the ways it may be reported and accounted. Information management applications and teaching / learning programs gather particles of data, aggregate styles of information and deliver packages of knowledge. This is an enterprise fraught with ambiguity and variation of interpretation.

The elaboration of ICT effects in education has polarised in different directions to represent interests in school effectiveness, social & economic development, fairness and other vested interests such as businesses. Effects in these senses are self-serving and backward map to opportunity factors and clusters of variables that many be found in any school context. No one effect may represent the contribution of ICT to schooling and it is my intention here to concentrate on administrative effects. One of the clearest articulations of the effects of technology in organisations is made in a suite of literature that divides around views that information systems lead towards a utopia and have meliorist powers in the present (for example, Hoffer et.al., 1999, Alter, 2002). The other views link information systems to the exclusion of being or the formation of a partial being (for example, Heidegger, 1977, Lyotard, 1979, Poster, 1990). These differing views both position ICT as a subset of the organisation information system, and central to the organisation work system. The central issue is neutrality. Marshall (1999) neatly captures the context in his debate of technology in the New Zealand school curriculum (p.167).

Technology is not a neutral means but a way of ordering, controlling, or … enframing, and seeing the world including human beings as a standing reserve of resources.

The context of schooling is engaged with super-structures of interest groups and enframed by the dominant ideologies. ICT in its neutral sense provides connectivity for information management, and in its engaged sense shapes the possibilities for human conduct. Regardless of where personal preferences rest on the matter there is a pragmatic element to schooling that ensures that where one debate ends another starts. Over the last 3 years New Zealand schools have become engaged with requirements for planning and reporting outcomes (Education Standards Act 2001, Education Act 1989). The context of schooling has been reconstrued and variously represented as a data-driven model or a self-reporting model, and student learning and networking outcomes have been integrated into a mandatory performance reporting framework. In this paper a case of a school wide response to the new requirements is told from the perspective of the new information system and a utopian view of ICT capacities. The analysis that follows reflects on other literature to identify other problem areas and redress.

SELF REPORTING SCHOOLS

The notions of self-review and self-reporting have been popularised in business organisations by accounting interests. Self-reporting methods present prepared (styled) data in an aggregated form
ready for auditing or to middle management for decision-making. The process assigns responsibility for end user systems and performance accountability to those involved with the lowest level of business activity. The process, hence also produces information (styled data) that may enter a feedback loop for quality improvement of the process (self review). Traditionally quality improvement data was retained and used by those at process level and measurable data passed up the line to managers for accounting audit. What is interesting about the recent use of the term self-review and attempts to locate process and outcomes indicators for schools is that there is a collapse of traditional line management structure and incumbent divisions of interest. The distinction of normative and formative has become arbitrary and a new standard of styled and unstyled data introduced.

Changes brought to the context of New Zealand schooling by way of changes to legislation (2000 onwards) have placed new requirements for self-review and reporting. For example, the former requirements (1994) for self-review were not sufficient after 1 July 2000 changes. Self review was formally defined in terms of the Board of Trustees function and described by the characteristics of (ERO, 1994, p. 3):

- Improving school education provision;
- Assuring stakeholders of attainment;
- Documentation for growth; and,
- Assistance for planning.

In addition requirements to establish strategic planning and evaluation of student achievement were added (ERO, 2000, pp. 2,3). The changes to the status of the School Charter in concert with the strategic realignment of key contractual documents that linked the school to the State have altered the context of schooling. Together the changes have brought fresh emphasis to data driven planning, local performances, process intervention, goal and target setting, and self-reporting. Closer co-operation between the control offices has also provided mandate for implementation.

The Ministry is working closely with ERO on this. We don't want duplication of effort. ERO is to focus its reviews on the self-review processes that schools are putting in place. . .A school that plans realistically and deliberately, and is scrupulous in its self-review is beyond reproach. . .As far as effectiveness reviews are concerned, ERO's external reviews will comment on and add to the quality of schools' self-review. Self-review is another name for data-driven strategic planning. How well achievement results are used to inform the strategic planning is the same notion as self-review (http://www.ero.govt.nz).

Self-reporting has become a key phrase in the implementation of change management in schools and tightly linked to planning processes and the lifting of student outcomes. The catchall solution provides immediacy for a perceived performance problem and risk management for several political problems. The net effect has been to export to schools the urgency to review current information management structures, planning procedures, and the appropriateness of current working frameworks. This has been facilitated through the availability of information and professional services (See “Thinking Template”, http://www.minedu.govt.nz ), in order to achieve the first report under the new expectations in 2004 on the 2003 school year.

SCHOOL INFORMATION SYSTEMS DESIGN

The school I worked with in 2002 (tagged School 3) to implement a new reporting system was responding to the change in context of New Zealand schooling. The principal and senior staff had worked together to make sense of the changes and arrived at a plan of action. The school was a 700 pupil primary school in an urban area with already well developed planning and reporting processes. The school information system was based on a three loop local area network (including wireless capacities) hosted by a Windows 2000 platform on Apple hardware. Integrated around the computing infrastructure additional paper based systems and archives were used to supply information to the core
management functions. The information system was aligned with the school management and governance structures to support effective communication and to retain institutional memory.

The management structure was flat with the principal and two assistants managing a syndicated staff deployment. The governance Board was structured into an executive and sub-committees, and enjoyed strong community participation and support. Decision-making in meetings was informed by summaries circulated by email prior to meetings and then represented by the sub-committee chair or others with particular knowledge. All meeting minutes were recorded by a secretary and circulated by email within two working days of the meeting. The distribution and circulation of information within the school proceeded in a similar fashion with checks and balances being maintained by gatekeeper roles. Audit procedures were maintained to fit meeting schedules and also for term by term and annual reporting cycles. Four professional staff were employed to maintain secretarial, personal assistant, accounting and general information management tasks.

The information system design represented a hybrid model that had been arrived at through successive adaptations, reviews and incremental change. The digital capacities had been progressively improved as ICT became available, procedures developed and staff trained to use the new opportunities. In parallel the traditional manual systems were diminished and only essential capacities retained. New staff had been trained and hired to meet the evolving information systems need of the school. The current system represented best practice for a fully functional and daily operational system. Its management and development were intentionally conservative so that the daily school needs could be met within agreed performance specifications and security requirements. This design typifies the configuration of most school information systems. They are in a constant state of review, they are responsive to change and yet accountable to daily organisation requirements, budgets, and the ever changing capacities of ICT.

My participation in School 3 came about because of another incremental change being brought by new data collection and reporting requirements, and the leadership belief that the inclusion of external expertise benefited process and outcomes. Increasingly all School 3 records, communications, and decision making data were being transferred to digital forms and considerable resources were committed to a five year staff training plan for ITC literacy. Assessment of the work loading associated with the new requirements lead the executive staff team to conclude that new information processing and storage systems would be required, and a significant restructuring of the information system form would be necessary.

SOFTWARE IMPLEMENTATION

The project had been initiated by changes in legislation and a perceived need to realign the schools information system to meet the new expectations. Careful assessment of the new requirements had been made by the principal and executive staff to translate implications into the School 3 context. These actions were the first step in a four-phase process to bring about the change. The strategy is summarised in Table 1.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Definition</th>
<th>Issues &amp; Problems</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Initiation</td>
<td>*Statement of what the problem is and how the information system should help.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Describe in general terms how the new system should work.</td>
<td>*Executive Team.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Agreement on purposes and goals of the proposed system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Excessive expense and unnecessary elaboration.</td>
<td>*Consultation with Board.</td>
</tr>
<tr>
<td>2.</td>
<td>Development</td>
<td>*Choice of design options, adoption of tentative courses of action, and negotiation of</td>
<td>*Project team of representative stakeholders.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Will the system genuinely solve the problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Can we assure</td>
<td>*External consultants.</td>
</tr>
<tr>
<td>3. Implementation</td>
<td>*Staff training, effectiveness audit, and operational testing.</td>
<td>*Can we convert painlessly from the old to the new? *Can political issues related to changes in power relations be solved?</td>
<td>*Syndicate teams *Software consultant.</td>
</tr>
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Table 1: Project Phases (Adapted from Alter, 2001).

My observations and participation in the process as a consultant were specifically in Phase 2 and for part of Phase 3. Phase 2 was driven by the project team of 14 members over a three month period. The key tasks were to:

- select a functional application package;
- style forms; and,
- raise a working prototype.

The selection process was initiated by research into software application packages currently on the market. This resulted in the identification of nine different possibilities. Selection then proceeded by an assessment of the vending companies and visiting or telephone interviewing other schools using the respective software. A set of 35 school specific criteria were also produced to assess the software against. The subsequent debate reduced the possibilities to five and these companies were approached to obtain sample software. The sample software was tested by everyone in the Project Team and the possibilities further reduced to three. Until this point in the process decision-making had been strongly influenced by perception of suitability, what other users of the softwares had said when interviewed, and initial impressions of the application packages when loaded onto a computer. The three companies who were all considered strong possibilities were subsequently invited to do 20 minute presentations to the Project Team. The resulting winner was chosen on three outstanding points.

- The application package had a web interface for ubiquitous access;
- The application package would be hosted by the company (not at school); and,
- The application package came with full technical (on call) support.

Until this point of Phase 2 the Project Team had worked fluidly and had found the democratic methods for debate and voting sufficient to make Team decisions. The choice of software had raised issues of paying for staff home Internet access, data privacy, more print resources, and school policies for insurance and use of school laptops at home and elsewhere. All these issues have been resolved by stakeholders and gatekeepers within the Team. However, the second task of designing report forms, data input, and gatekeeper roles was more difficult. The utopian perception of the new system was one of efficiency and effectiveness for work processing but nagging doubts were surfacing that the new system would unfairly place excess loading on classroom teachers. Discomfort was being express in different ways at shifting boundaries and uncertainty of the new roles. Teachers expressed
concern at being distanced from teaching and the potential for disproportionate preoccupation with assessment and reporting. Other critical edges became visible on two fronts. First the classroom teachers felt constrained by the imposition of structure and the use of new terms to express each element of learning, and second the school executive felt strongly that defining student performances on for example a five-point scale, under valued high achievement and failed to differentiate low achievers. These issues were hotly debated and only found resolution in rulings and mitigation undertakings.

The third task in Phase 2 was completed by the software vendor in consultation with two of the ITC specialist teachers. The demonstration prototype came in both digital and hard copy forms and illustrated the power of the new system to take data at classroom level from testing and assessment instruments, have data entry by the teacher anywhere anytime, and then produce a series of different reports for the various stakeholders. Key reporting went to the teacher, the parent, the syndicate leader, the school executive, the Board of Trustees, and to external control agencies. Each stakeholder had data styled into a different form and in keeping with the functional purpose. In concert with the software capacities the broader information system architecture was demonstrated to illustrate the co-ordination and integration of events required for a successful operation. Table 2 summarises data types and stakeholder interest.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Unstyled Data</th>
<th>Styled Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>Quality Improvement in Learning</td>
<td>Capability Indicator</td>
</tr>
<tr>
<td>Teacher</td>
<td>Quality teaching</td>
<td>Class Profiles</td>
</tr>
<tr>
<td>Parent</td>
<td>Confusing</td>
<td>School Report</td>
</tr>
<tr>
<td>Syndicate Leader</td>
<td>Quality Planning</td>
<td>Classes Profiles</td>
</tr>
<tr>
<td>School Executive</td>
<td>Quality Targeting</td>
<td>School Profiles</td>
</tr>
<tr>
<td>Board of Trustees</td>
<td>Confusing</td>
<td>School Performance Report</td>
</tr>
<tr>
<td>External Agencies</td>
<td>Confusing</td>
<td>National Performances</td>
</tr>
</tbody>
</table>

Table 2: Stakeholder Data Interest

Phases 3 and 4 of the Project were taken over by the people most affected in the school and managed through the relationships and networks set up in phase 2. As an external observer it was clear that the intervention had changed the way things would be done in the future and the usual routines had been unsettled. Teachers talked about their worries – largely related to new work loadings and perceived separation from previous areas of control. The worries however were all held at bay by the universal belief that provided the information system worked there would be work pressure easing and utopian good could flow to the students and parents. Experienced teachers recognised the limitation of the ICT knowledge scope and the capacity of ICT to deliver what was promised in a human environment. They could foresee the intensification of work activity but not the attainment of quality learning and reporting of the same standard that had already been achieved by knowledgeable people, experienced in professional services. Other voices cited the potential to be seen as a leading school and more perceived efficiency and effectiveness as gains.

EDUCATION EFFECTS

The effects of technology (ICT) in the societal and education have been tracked by others elsewhere (Lyotard, 1979, Peters, 1989, Cusack, 1995). The purpose here is to give a short review and to reflect on the observations in the software implementation at School 3. Lyotard (1979) invited a critical reflection on the nature of change being experienced through the “computerisation of society” (p. 7). In this view technology had different effects than science and was involved with legitimating decision-
making and supporting the goal of power (p. 45). At School 3 technology (ICT) was being implemented to comply with the exterior wishes of Government for reporting outputs. The net effect of the new system would be the retention of information that could be used for the legitimation of decisions and intervention into learning contexts. The system collected data, processed data, and disseminated information to the various levels of interest for action purposes. Embedded in the system was also a belief that decisions based on this information could be justified by recourse to the system.

Teachers commented on the intensification of work practices with the new information system and expressed disquiet at separation from teaching–learning relationships. Much of the debate in Phase 2 task 2 centred around transferring student performances into representative statements, scales and visual representations. The vigorous negotiations reflected a perception that the current systems better represented the truth of the matter and that the new system was a productive cycle that would inevitably exclude some of the evidence and proofs for a comprehensive report on student performance. These views correspond with Lyotard’s statements regarding the goals of technology being different than those of science or justice, and the effects of efficiency, performance optimisation and proof production (p. 58). In part the implementation was bringing a shift in the power base at School 3 – although much had already occurred in previous information system upgrades. Those who were prepared to run with the new scenarios and utilise the new systems capacity for leverage (for example, using the new systems power language(s)) could exert previously unfound influence. It was notable that influence came less from computer knowledge or skills but more from those who were able to speak the new power language. This observation illustrates an effect of Lyotard’s concept of performativity, and the notion that leaders are players. Leaders as players is a rejection of the traditional role of schools in the training and development of professional leadership and an adoption of the effect that success is found in “supply(ing) the system with players capable of acceptably fulfilling their roles at the pragmatic posts required by its institutions” (p. 48).

Lyotard’s critique of knowledge in post-industrial societies leads to insights of unintended consequences for technology implementations. In a similar vein but from a different perspective Heidigger’s (1977) discussion of technology, and various critiques of Heidegger’s work on technology (for example Zimmerman, 1990, Marshall, 1999), move the understanding of technological effects beyond instrumental observation and deeply into understanding being and human being in relation with technology. Zimmerman (1990) summarised Heidegger’s contribution as “addressing the all-embracing character of modern technology, its uncheckable tendency to transform both social institutions and the natural environment” (p. 248). He then went on to make the same claim made by Marshall (1999, p. 170) that the essence of technology in Heidegger’s view is a one dimensional way of disclosing (defining) entities to be raw materials, and pushing humans to behave in accordance with the technological imperative of infinitely expanding production for its own sake. In School 3 the technology (ICT) implementation for reporting was in its infancy and the greater view of the system being used to inflate, produce and output reports of an infinitely expanding nature was not visible. The notion of enframing (Heidegger, 1997, p.19) was however visible even at the early stage. The notion of enframing captured a conception that the essence of technology was to stamp work on humanity and to demarcate humanity as an exploitable resource. The teachers contested many of the challenges made to the natural order of educating (such as language and linguistic objects) by verbalising doubts if utopia may be best served by definitions, proposed courses of action and so on. Work had two faces. One where the teacher was to produce the data from assessment instrumentation and key this into the new system anytime anywhere, and the other, that styled data would be looped back into the work space to create more work and different work.

CONCLUSION

A meliorist and utopian view of ICT leads to a set of expectations that may not be obtainable in the working environment of most organisations. Other views of ICT acknowledge that technology carries its own agenda into work and social contexts, and that effective utilisation of ICT accounts for intended and unintended consequences. The push for self-reporting schools, and the current political and central control agency interest in school planning and reporting can be viewed as independent of
ICT and the critique mounted by alternative perspectives on ICT effects in education. However, the ERO and MOE literature reviewed all link the initiatives to a hope for greater ICT capacities, for better information processing, and educational resources as standing economic reserve. Such complicity warrants further examination and a teasing out of the relative gains and losses to the natural reserve.

REFERENCES


