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Understanding Teacher Practice Through Evaluation: A Complex Task

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This paper uses a study in progress regarding the use of Information and Communication Technologies (ICT) by teachers as a basis from which to inform the methodology for evaluating teacher practice. The paper is based on the contention that any evaluative research into the implementation of a new programme or tool for teaching or learning, into mainstream classrooms, must be firmly based in teacher practice if it is to impact on policy and practice at either a national or local level. It is suggested that the failure of many of the innovations and reforms of the past can be seen as a failure to fundamentally change, or even to take into account, teacher practice. Those that have taken root tend to be either on the fringes of the educational system or to be readily assimilated into the current system. Any evaluation of teacher practice is difficult given the complexity of the many contextual layers within which teachers work. Thus the study discussed here uses both qualitative and quantitative methods as it attempts to describe and explain the current use of ICT in four secondary schools.

The beginning of the 21st century has seen unprecedented calls for reform in education worldwide. At the centre of the calls are two major concerns: firstly, the desire to raise achievement for all students and secondly, the belief that education must meet the demands of what has been termed the "knowledge age". Reforms centred around standards-based assessment and a return to the basics appear to clash with calls for a student-centred approach which utilises the potential of information and communication technologies (ICT), which are increasingly seen as the central teaching and learning tool for the 21st century.

Calls for school-based reforms and demands for the education system to meet the needs of the wider world are not new. Nor is the apparent lack of success of many of the reforms introduced. The history of educational research and evaluation is littered with stories of failed reforms and innovations (Tyack & Cuban, 1995).This raises two related

questions. Firstly, why educational reforms frequently fail to take hold and secondly, whether educational evaluation has a role to play in the implementation of successful reform.

In considering the first question it is necessary to ask whether the failure is a result of inadequacies in the policy underpinning the reform or whether it as a result of inadequate implementation at a school and/or classroom practice level (Selwyn, 1999) . That is to say is it a program failure or a theory failure (Suchman, 1969)? Teacher change literature frequently attributes the failure of reforms to implementation issues including a view of teachers as resistant to change as well as organisational and personal features (Richardson, 1990). Other literature considers the difficulty of changing teacher practice through policy particularly in areas of practice such as task and discourse (Spillane & Jennings, 1997). Selwyn (1999) argues, for example, that the policy underpinning the implementation of information and communication technologies in schools is "fundamentally flawed" and that this is the main reason for the lack of implementation.

The second question asks whether educational evaluation should be educative given this climate of change. That is to say whether it should be "designed to improve educational policymaking or practice" (Hammersley, 2003, p 19.). While the authors would not argue that this is the only reason for educational research this paper suggests that there is a place for educative evaluation where the purpose is to bring about "worthwhile educational change"(Elliott, 1990, p. 4).

In order to avoid repeating the mistakes that have led to the failure of past reforms evaluation must seek to understand current policy and practice. The true value of such educational evaluation should be judged by "its capacity to resolve educational problems and improve educational practice" (Carr & Kemmis, 1986, p. 109). In this way evaluation is both part of the problem and a potential solution. The typical approach to evaluation, which describes processes and outcomes is limited in its ability to impact on policy and practice in that it does not generally attempt to understand the theories-in-use of both policy-makers and practitioners, as opposed to their espoused theories, in order to explain the outcomes observed. A theory in this context can be understood as "a set of understandings about how to achieve desired consequences in a given set of

circumstances"(Robinson & Walker, 1999, p. 241). However, evaluation, which attempts to understand both teacher practice and policy, has the potential to facilitate change.

The warrant for placing an understanding of policy and practice to the forefront can be found in two areas. Firstly, where reforms have succeeded they have tended to be those that do not impact to any significant degree on teaching, or learning, in mainstream classrooms. Indeed classroom practice has shown itself to be strongly resistant to externally mandated change (Cohen & Spillane, 1992). Where such attempts have been made teachers have frequently chosen to adapt the reform to current practice or to reject it outright (Tyack & Cuban, 1995). For systemic change to occur there must be change to teacher practice and where this does not occur reforms tend to fail (Richardson, 1990). Evaluators must therefore consider why practitioners adopt, adapt or reject new programmes and/or tools. Secondly, there is evidence to suggest that what happens in the classroom is the single most important factor impacting on student achievement (Alton-Lee, 2003). Policy, which is not informed by the needs of practice, can therefore be seen as having limited potential for either full implementation, or successful student-based outcomes.

Both teacher practice and policy can be seen as solutions to practical problems of what to do within a given situation (Robinson, 1993). In order to resolve a problem teachers and policy makers must take into account a range of constraints, that is conditions that determine the appropriateness and efficacy of their solution (Robinson, 1998). This view of practice, including policy, has important implications when designing evaluation to meet an educative purpose. Changing practice requires an understanding of the logic and reasoning that led to that practice in the first place. In this way an alternative solution, or new practice, can be offered which meets both the original constraint set and offers significant new benefits. Without such understanding any new practice may be an inadequate solution when judged against the constraint set of practitioners or may be viewed as unnecessary by practitioners satisfied with their current practice.

This level of understanding requires engagement between evaluators and practitioners. There are three aspects to engagement, which may be present in different research activities. The first involves the researcher attempting to understand the constraints that

explain the activities of the practitioners (their practice). In this way they bring to the surface the practitioner theory-in-use (P-theory) in order to explain and understand current practice. In the second aspect researchers critique and analyse current practice through the lens of their own theory (R-theory). Such critique raises the possibility of alternative practices. The third aspect involves debating the relative adequacy of both P-theory and R-theory through critical dialogue. In critical dialogue P-theory and R-theory are treated as competing theories and each is rigorously evaluated. The relationship between evaluator and practitioner becomes one of mutual learning and influence. It is this third aspect of engagement that underpins the second phase of the study described later in this paper.

While there are risks to "engaging rather than bypassing existing practice" (Robinson & Walker, 1999) evaluation cannot influence either policy or practice if critical dialogue does not occur. Where a reform is perceived, by practitioners, to be an improved solution to the practical problems they face its chances of successful implementation are greatly increased. For this to occur practitioners must believe that all the constraints impacting on their original problem have been considered. Richardson (1990) argues that a "strong focus should be placed on teachers' cognitions and practical knowledge in a teaching change project and these should be considered in relation to actual or potential classroom activities" (Richardson, 1990, p. 13). She goes on to state that any new practice needs to "embedded within a theoretical framework of importance to teachers and education" and that concepts need to "filtered through [teachers] beliefs, intentions and understandings of context (ibid, p. 16).

The purpose of this paper is to contrast two approaches to evaluation and to consider the role evaluation has to play in the implementation of educational reform. More traditional evaluation considers the processes and outcomes of a reform, frequently through the use of quantitative data such as surveys. However, if the purpose of the evaluation is educative it is necessary to also attempt to understand the reform through the lens of the practitioners, that is to get close to the minds of teachers. As Pring (2000) asks "what sense can be made of educational research and theorising unless it attempts to make sense of the practice of educating and unless it addresses the problems as they are perceived by those who are engaged in [the practice of educating]" (Pring, 2000, p.30).

The following sections of this paper describe the methodology used in a study currently being undertaken into the use of ICT by secondary school teachers in their classroom practice. In this instance classroom practice is any use that involves the direct use of ICT for student learning. The study was designed to produce both quantitative and qualitative data and as such uses methodologies from within both paradigms. The purpose of the study is educative in that its purpose is to firstly better inform policy makers, at both national and school level, as to the best steps to take to increase classroom usage and secondly, to provide participants with an opportunity to reflect on the use of ICT in classroom practice in order to inform future practice. While the study is research based rather than evaluative problem-based methodology (Robinson, 1993), the conceptual framework used, applies equally to the evaluation of school-based reform.

The implementation of ICT into classroom practice is a valid example in that the integration of ICT has been a key emphasis in educational reform since the latter part of the 20th century (Institute for Professional Development and Educational Research, 2002). Research shows, however, that ICT is not having a significant impact on classroom practice, and therefore student learning, despite high levels of infrastructure and staff training. This raises the spectre of yet another technological reform in teaching and learning becoming a "white elephant"(Cuban, 1986). Indeed the lack of implementation within educational contexts is conspicuous given the success of the new technologies in businesses and homes ((Selwyn, 1999). Evaluation that focuses on teacher practice and on the policy underpinning the integration of ICT is therefore necessary in order to better understand why teachers appear to be resistant to the use of ICT in their classroom practice despite frequent espousal of its value.

Computer-based technologies have been described as having the potential to transform our schools from the traditional teacher-centred model to one that is student-centred and which will provide students with the skills needed for the 21st century (Papert, 1998). Government policy is clear on the perceived importance of ICT in education. Projects such as Digital Opportunities and Information and Communication Technologies Professional Development (ICTPD) are evidence of the priority here in New Zealand. The result has been a rapid digitalisation of schools through the provision of hardware and staff training (ERO, 2001; Sullivan & Anso, 2000). The 2003 budget allocated a

further $78 million of new money for ICT over the next four years. In announcing this extra funding the Minister of Education, Trevor Mallard, made the prominence of ICT in education policy clear when he stated:

> One of our key education priorities is to build an education system that will equip New Zealanders with 21st century skills. ICT is an incredible tool for learning and ICT skills are essential for work and for life in the modern world (Mallard, 2003).

However, while there have been major advances in the level of infrastructure provided (installation) and in the level of administrative and professional use there is little evidence that ICT has impacted on either teaching or learning ((Becker, 2001; Cuban, 2001; Lai, Pratt, & Trewern, 2001; Shakeshaft, 1999). Rather ICT has barely begun to "dent the daily routines of classrooms" (Loveless, 1996, p. 448). Where ICT is used it tends to be to strengthen current classroom practice rather than moving towards a more student-centred approach (Cuban, 2001; Girod & Cavanaugh, 2001).

Researchers offer two types of explanation for the level of use (R-theory). The first of these suggests that full implementation is only a matter of time ((Becker & Ravitz, 2001). Secondly, many studies attribute the lack of classroom use to contextual factors which act as barriers to the integration of ICT ((Murray & Campbell, 2000; Smerdon et al., 2000). Yet these explanations, while having validity are limited in that they do not explain the wide variation in levels and types of use. Neither of these explanations take into account the necessity of changing teacher practice in some way in order to facilitate the incorporation of new tools or the fact that teachers as "gatekeepers to their classrooms" make "contextually constrained choices"(Cuban, 2001). The main barrier to the integration of ICT into the classroom may well be "the nature of teachers' work" (Loveless, 1996).

If one adopts the view that ICT is not compatible with teacher practice as it stands then the policies underpinning the integration of ICT can be seen as deficit in meeting the needs of teacher practitioners, as they perceive them. Many practitioners may not see the integration of ICT into classroom practice as an adequate solution to the constraints they face. Selwyn (1999) argues strongly that "the 'failure of educational computing should not be solely attributed to deficiencies of practice, rather…. the foundations of

educational computing, i.e. the policy and discourse behind the innovation, appear weak and inappropriate" (Selwyn, 1999, p. 86).

Research into the use of ICT, which tends to centre on descriptive studies using data from detailed surveys, does not provide sufficient explanation of the logic underpinning teacher practice to facilitate significant new practice, which is needed if computers are to be more fully utilised. The results of such studies are generally self-reported descriptions of the current level, and type of use, by participants, as well as potential explanations for the described use as suggested by researchers (R-theory). While rigorous and valid descriptive studies are needed and serve important purposes such as baseline information and comparisons across either time or communities this method is limited in a number of ways. Firstly there is the issue of the reduction of what is a very complex phenomenon to simple correlations. Teaching occurs within a complex context where a number of interacting factors impact on teacher practice. The structured nature of questionnaires means that participants respond to suggested factors item by item and there is no sense of the interaction between factors or of the logic, or reasoning, being employed by participants. The second concern is the reduction of individual differences to mean values. In so doing individuals at either end of the scale are lost and variations in use not accounted for. Thirdly, and perhaps of most concern, is the fact that surveys privilege researcher theory (R-theory). Questionnaires are designed to test certain theories not suggest new ones and participants are responding in the main to external pre-determined theory (R-theory). There is little room for practitioner theory (P-theory) to be espoused and analysed. The importance of considering teacher practice and the reasoning underpinning it is clearly stated by Cuban when he says:

> Consider the most common goal of school reform over the last century: changing teacher behaviour. Already mentioned is the staggering inventory of efforts aimed at altering what teachers do in their classrooms. Reformers, however seldom ask the basic questions: How do teachers teach? What is constant and what is changed in their teaching? Why do they teach the way they do? Instead, reformers desperately seeking improvement …as they define it..jump to the question: How should teachers teach? (Cuban, 1988, p. 101)

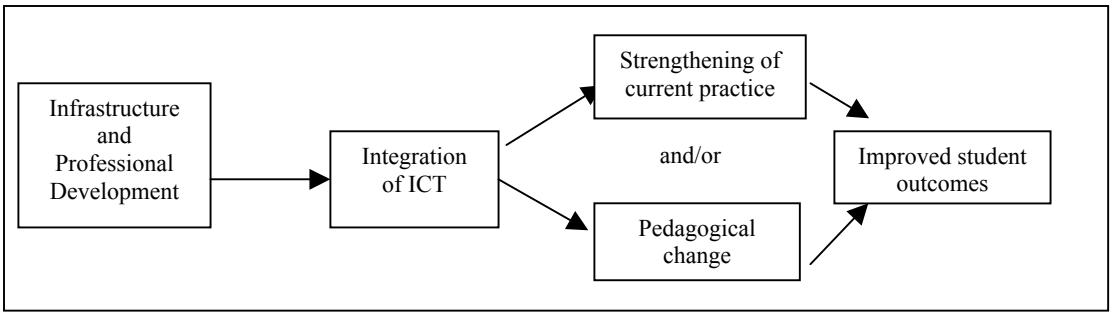
For evaluation to be educative there is a need to ask the same questions. The study discussed here is comprised of two separate phases using contrasting methodologies and attempts to ask these questions. The research design and method for each phase was determined by the type of question being asked.

In the first phase a 31-section questionnaire containing 193 items was used. For all items related to use and potential constraints teachers were asked to respond using a four-point scale. The purpose of the first phase was to describe current levels of use in schools whose level of infrastructure and commitment to professional development was high and to test the validity of a number of factors that had been suggested in research based literature as being constraints on teacher use (R-theory). In this way current R-theory about levels of use and the reasons for it were critiqued. The data from this questionnaire was analysed statistically and a factor pattern between levels of use and potential constraining factors was developed. In the second phase critical dialogue between the researcher and purposively selected participants was undertaken. The purpose of this dialogue was firstly to better understand P-theory and the use of ICT in classroom practice through the lens of classroom teachers and secondly to evaluate R^2-theory (theory developed from Phase 1 after analysis of R-theory as found in the literature).

Findings from the first phase suggested that the overall level of use in the classroom was minimal in all schools and that where ICT was used it was in very limited ways such as for research or word processing. The factor pattern showed that only two factors impacted significantly on teacher use of ICT in classroom practice. These two factors were intrinsic motivation arising from a perceived need to use computers and self-efficacy, or confidence, in the use of computers for classroom practice. The model also showed that barriers to use such as limited infrastructure did not impact significantly on classroom use. Such findings are important when one considers that current policy for the integration of ICT appears to operate on the model shown in Figure 1.

Figure 1

Theory of action for the implementation of ICT into schools



The findings from the survey are important in that they provide a basis for critiquing R-theory as found in the literature and offer a new theory of action for the successful integration of ICT involving a different model of professional development. As discussed earlier however such findings do not adequately explain the theory-in-use of practitioners (P-theory). An explanation of the logic underpinning practice would explain more clearly why some teachers see ICT as a solution that meets the constraints they consider important while others see ICT as an educational problem in need of a solution. It would also provide an understanding of why some teachers are confident in their ability to facilitate learning using ICT why others appear to lack the necessary self-efficacy.

Phase 2 of the study was therefore designed using the questionnaire as the starting point with the purpose of further unpicking the understandings and perceptions of practitioners regarding the use of ICT in the classroom. A total of 40 participants were selected from each of the four schools and included both senior management and classroom teachers. Senior management were interviewed to determine their understandings of the use of ICT in the classroom as an indication of the theory-in-use underpinning policy at a school level. Participants covered a range of subject areas and levels of use.

Four standardised scenarios depicting teachers using ICT in their classroom were used as the starting point for the dialogue. These scenarios depicted teachers at various levels of ICT use from compliance use through to developing constructivist pedagogies (Table 1). The scenarios were kept deliberately generic and did not refer to subject areas or student year groups. The order in which teachers were given the scenarios was rotated. Each of the teachers in the scenarios was given a male name to avoid gender bias. The two

aspects of R^2-theory included in the scenarios were those shown in Phase 1 as being significant – need and self-efficacy. The generic nature of the scenarios and the questions used as prompts during the dialogue were designed to ensure that practitioners did not respond only to R^2-theory.

Table 1

Researcher explanation of scenarios.

Teacher	Level and type of use and possible explanation
Bob	A very traditional teacher using computers out of compliance. Sees no need for them as he is already achieving what he perceives to be good academic results with traditional teaching methods. Very limited use of computers as a result. Not overly skilled in the use of computers.
Tom	Sees some benefits to using computers primarily as something different to do which will motivate his class. Retains control. His use could be described as replacement use in that he uses computers in one unit of work to achieve the same outcomes with a different tool. Has some skill himself.
Harry	Sees computers as a very useful tool for strengthening what he has already done. Retains full control of his class and fully integrates computers into his existing classroom practice. Extensive use. Has some skill himself.
Fred	Innovative teacher who wants to move to fully student-centred approach. Uses computers extensively to enable this to happen and becomes a facilitator of learning. Limited skill. Does not see his skill level as important.

Participants were firstly asked to evaluate the quality of teaching in each of the scenarios on a 9-point scale where 1 was poor and 9 very good. They were then asked to explain their ratings. These explanations provided an understanding of what they considered to be good teaching practice and what they saw as valid uses of ICT in that practice The conceptions of teaching revealed by this indirect method of inquiry are likely to be more predictive of actual practice than would have been revealed by more direct questioning alone. However, a number of more specific questions were also used where necessary, which asked participants about their own practice. These included:

1. Which one of these teachers most closely resembles you and what are the similarities?
2. Which one is most different and what are the differences?

3. Is there one of these teachers you would like to be and if so what is stopping you?
4. Which one of these stereotypes do you see most often in your own school and which one the least? What do you see as the reasons for this?
5. Which of the scenarios do you think is the most beneficial for student learning?
6. Your overall level of use on the questionnaire was ….. Does that seem about right to you? Can you explain why this is your level of use?
7. On a scale of 1 - 5 how important do you consider computers to be to teaching and learning and why?

The use of standardised scenarios allowed teachers to talk more generally about teaching practice and offered alternative practices for them to consider and rate. They also provided the researcher with a chance to offer concepts and theories for discussion. For some teachers the scenarios offered new ideas of what could be done and allowed them the opportunity to reflect on their own practice. In all instances the interview more closely resembled a dialogue than a traditional interview with both the researcher and the participants fully engaged in a conversation relating to the use of ICT in the classroom. In this way both R^2-theory and P-theory were examined.

Participant responses suggest that the nature of teachers' work is indeed a major barrier to the integration of ICT. As one participant said she used ICT in one instance because "it happened to fit in with what we were doing at the time". When considering the Fred scenario another stated that "this is a hard one for me to put my head around because it doesn't really fit with what I do". The nature of their work, their classroom practice, appears to be determined by three main constraints: their expectations of the ability of students both academically and organisationally, the perceived demands of their subject and external assessment demands. Examples of participant comments related to these constraints include:

- What I teach is based upon concepts or theories, which have to be understood to be able to do the next bit.
- I don't think they would go out and find, have a good understanding on their own, they need interaction much more discussion type things.

- Students who are not in routines and find difficulty planning their own work, I think would then flounder unit after unit.
- Whereas now because of that assessment we are constantly training them and so on and so forth and getting them into assessment system.

Classroom management and the perceived need for teachers to be in control of the processes occurring with in the classroom was also a constraint on the integration of ICT for many participants. As one participant said "making sure you know what you are doing before you take them in there and do it, I think is really good practice".

While many participants felt that a more student-centred approach was the ideal they did not see it as working in their current environment and did not really see a need to change what they were doing. That is their current practice met their educational constraints. When asked whether there was a need for classroom practice to change, to use ICT more, one participant responded that "it doesn't desperately need to…..from the kids point of view doing that, there's probably nothing really that they're doing in my classes that would work for them to do it". She went on to say that "there's too much thinking that's needed to work out where and exactly how and what you would do".

There were clear differences between the espoused theories of participants and their theory-in-use. Even amongst those who hardly used ICT in their classes there were few who could not give an example of where it might be useful. The issue was not seeing a value in ICT it was that the solutions it offered were not applicable to the constraints that most concerned them. Their espoused theories closely fit the arguments underpinning policy including meeting the needs of the knowledge age, meeting the needs of changing and diverse students and the use of computers in the wider world. However, these constraints are not those that they are concerned with in their daily classroom routines. Their classroom practice is far more pragmatic and is about meeting concrete goals effectively and efficiently.

In conclusion then the study discussed here provides an opportunity to compare the findings of two different methodologies for explaining the use of ICT in the classroom. In so doing it offers an example of the potential of evaluation to impact on policy and practice through a deeper understanding of teacher practice. Both methodologies are

relevant and offer important findings for the future integration of ICT. In the first phase the level of current use was described providing valuable base line information from which to compare both past and future findings. The impact of various factors was also considered and two significant factors determined suggesting a way forward in terms of increasing use. In the second phase however the focus shifted to individual practitioners and their perceptions of teaching and ICT. Findings from this phase have highlighted the size of the gap between policy and practice in the area of ICT. ICT has much to offer education but it must also either meet the pragmatic constraints that teachers currently face or the constraints under which they practice need to be redefined. Teachers need to see a value in using ICT, they need to see it as a solution to the problems they face when meeting the external pressures put on them. For the potential of ICT to be met and for the emphasis placed on it to be warranted policy and practice must be brought closer together. Policy makers must ensure that the steps they take to integrate ICT are determined on the basis of the needs of teachers and learners and not on any technologically determined basis.

The wider implications of the findings from this study are that evaluators and researchers, whose aim is to bring about reform in education, must provide clearer pictures of not only current practice but also of why teachers teach as they do. Policy makers must then be able to offer alternative solutions, or educational practices, which not only meet the current constraints face by practitioners but also offers them significant benefits. In this way educative evaluation/research, policy and practice can work together to successfully implement change in teaching and learning.

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