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Getting ready to change: the place of change theory in the information technology education of teachers

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Abstract

This paper argues that information technology training and support for teachers has traditionally focused on issues of hardware, software and pedagogy, neglecting to identify, analyse or shape the nature of the processes of change which accompany technological innovation. The paper therefore examines the nature of computers as an educational resource and discusses the consequent changes in knowledge, skills, attitudes and behaviour required of teachers who use information technology. The paper also addresses the skills and knowledge required for teachers to be effective change agents beyond their classrooms, to support their own use of technology and to act as catalysts for organisational change. The paper refers to concepts and techniques from the literature on change theory which have already impacted on school development in order to help educators understand and locate their place within processes of technological innovation and equip them to exploit opportunities for bringing about improvements. The concluding section of the paper argues that an understanding of the phenomenology of information technology innovation in schools and of educational change in general ought to be required of every computer using teacher. Teacher educators must acquire this knowledge to understand better the nature of the task facing their students and so provide these students with relevant support and training.

Keywords

Professional development, teacher education, information technology, innovation

1 INTRODUCTION

It is likely that we have much to gain from the application of change theory to the introduction of IT in education....Teacher educators should consider the need for pre-service and in-service teachers to understand and master change processes alongside their IT development. (*Final Report of Professional Group on IT in Teacher Education, World Conference on Computers in Education, 1995*).

1.1 The 3 phases of information technology innovation

Early information technology (IT) initiatives in schools were essentially technology centred. The principle seemed to be that 'as long as the facilities are available and teachers are trained in computing, adoption... is inevitable' (Anderson et al, 1979, p. 229). But it soon became evident that access to hardware and software alone were insufficient to ensure successful uptake. Learning how to use information technology in the classroom involves more than training in hardware and software use. It requires pedagogic understanding of what computer assisted learning applications are trying to do and of what the hardware and software are capable of doing. In consequence, later initiatives tended to focus on pedagogic rather than technical concerns. Still, however, the uptake of information technology in schools has been patchy and in the search for more effective technological innovation, those involved have come to realise that human factors are important variables in the change process. Increasing attention is therefore being paid to human and institutional as well as to technological and pedagogic issues. For example, in the United Kingdom, schools themselves and educational support agencies have increasingly turned to the personal and institutional factors involved in technological change. The National Council for Educational Technology (1993) noted in its medium term plan for 1993-6 that: 'case studies from commerce and industry show that effective use of IT is accompanied by personal and organisational change' and in the last 5 years there have been many publications which focus on organisational and human issues in relation to information technology innovation. (For examples, see NCET, 1995; Passey and Ridgway, 1992; Eraut et al, 1991.)

The historiography of IT development resonates with current theories of educational change. The attention which has been paid successively in teacher training (both pre-service and in-service) to hardware and software, then to pedagogy and now to human factors in IT use in schools mirrors Fullan's (1991) belief that educational innovation requires a change of teaching resources, teaching strategies and beliefs. Fullan observes that most change efforts have concentrated on changes which overlooked people (behaviour, beliefs, skills) in favour of things (regulations, materials) and this is essentially why innovation has failed more times than not; people are much more difficult to deal with than things but also more necessary for success (p. 249).

Information technology poses an enormous, possibly unique, challenge as a resource to the teacher because its use demands considerable shifts on **all** fronts. Numerous authors accept that the use of information technology may be changing the way teaching is conducted (see, for example, Sheingold and Hadley, 1990). The fundamental change required to use computers for teaching is to teachers' existing conceptions of the teaching learning process and to their conceptions of their pedagogic role within it. Such authors as the above identify among computer using teachers, a shift from teacher directed teaching to student centred learning, often socially dynamic, in environments that are complex and interactive. In this, it is not just new skills and competencies that are required. Computer use in schools also requires changes to educational ideology (Wild, 1993). Faced with the scale and complexity of such changes, it becomes clear that we must ensure we help colleagues to respond positively to the profound changes required of them, to consider such changes critically, to accept them where appropriate and to manage the transition process effectively.

2 TEACHERS AND CHANGE

In order to accommodate information technology in their teaching, teachers require not only knowledge of the changes required and the skills to accomplish them but also in relation to the processes of change itself. In order to master and guide technology innovation in schools, teachers require a procedural and conceptual knowledge of change. They need to understand the process of change, be able to locate their place in it and then be able to act.

2.1 Attitude

Whilst some teachers can cope adequately with large scale change, others are far more conservative in nature. In fact, with regard to the adoption of computers, it has been found that teachers as a professional group are highly conservative (Adkisson, 1985; Gillman, 1989). Many teachers enjoy stability, see change as a threat and shun problems as undesirable. Yet it is a recurrent theme of change theories that change should be viewed positively and confidently. This is not to say that change is not uncomfortable: 'Almost every important learning experience we have ever had has been stressful' (Block, 1987, p. 191) and Schon (1971) reminds us that all real change involves passing through zones of uncertainty - the situation of being at sea, of being lost, of confronting more information than you can handle (p. 12). Despite all this, however, change theorists argue that the teacher can, and should, adopt a positive attitude to change and learn to accept it as a valuable part of professional development: 'The anxieties of uncertainty and the joys of mastery are central to the subjective meaning of educational change' (Fullan, 1991, p. 32). Teachers must also learn to accept that 'Conflict is fundamental to any successful change effort...success in school change efforts is much more likely when problems are treated as natural, expected phenomena, and are looked for' (Fullan, 1991, p. 27). Eraut's (1988) study of the uptake of information technology in schools found computer using teachers who exhibited typically positive attributes - teachers who possess confidence, seek out opportunities for change, enjoy risk taking and are willing to work with new methods of learning. Teacher educators should help teachers to develop confident, positive, proactive attitudes so that they may cope more effectively with the challenges of technological innovation in schools.

2.2 Action

If teachers are to use information technology successfully in schools, they need to become effective change agents. An effective change agent is a teacher who can take responsibility and action to exploit the many opportunities in a school for bringing about improvements (Fullan, 1991, p. xiv). Teachers must have the capacity to know **when** and **how** to pursue and implement certain change possibilities. While many goals may be identified as desirable, not all are attainable. There must be a critical assessment of whether or not action is desirable in relation to certain goals and whether or not the action is implementable - in brief, whether or not it is worth the effort. Teachers need to weigh carefully the strengths and weaknesses of their plan - searching for opportunities and evaluating their merit, identifying obstacles and threats and assessing whether or not they may be surmounted or obviated. The most

responsible act may be to reject goals and actions that are bound to fail and to work earnestly at those that have a chance of success (Fullan, 1991, pp. 103-4).

It is important for the teacher to know how to cope with policies, programmes and constraints that are imposed upon him or her (Fullan, 1991, p. xiii). Much depends not just on the individual but on the organisational context within which the individual is working. It is rarely possible for a single teacher's desire to use IT in his or her teaching not to be affected by wider policy, timetable, curricular and resource issues within a school. The IT using teacher will therefore often need to effect change elsewhere in the institution. Moreover, many teacher change agents will see whole school change in relation to IT to be a highly valued goal in itself, not just in relation to the realisation of their own teaching needs. But schools, like individuals, can be conservative places. Many researchers (Cuban, 1984; Kerr, 1989; David, 1991; Papert, 1993) have indicated that schools have changed very little in the last century. What appears to some individuals as a straightforward professional improvement can, to an organisation, be felt as undesirably disruptive if it means that the culture must change its values and habits in order to accommodate the alteration. Change agents should be aware of a natural resistance to individual or organisational change in schools and understand that this might play an important part in shaping the institution's response to any use of information technology.

In order to facilitate their own teaching with IT and/or to move the school forward technologically, teachers require strategic problem solving and evolutionary planning models which are based on knowledge of the change process and which emphasise organisational issues (see Louis and Miles, 1990). For example, recent work by MIT which looked at the process of IT innovation within industry has been used by the UK National Council for Educational Technology (1995) as the basis for a 5 stage model of technological change in schools which can provide a framework for action. The model identifies characteristics of a learning organisation at successive stages of technological development and so provides a means for locating the present state of institutional development together with targets which imply action.

Ultimately, the goal must be to establish schools which are effective 'learning organisations' - that is, institutions which are responsive and proactive environments, manifesting a flexible and adaptable culture in the face of desirable or necessary technological change. Such institutions will acknowledge the role of individuals as agents in the change process and support their empowerment. Staff must be supported by a culture where it is constantly possible to learn, where visions are shared and which essentially encourages risk taking and the possibility of change by creating a safe climate of innovation.

3 THE ROLE OF TEACHER EDUCATION

There is little evidence to date that these 'learning organisations' already exist or that we are preparing individual teachers to create them or to function optimally within them. In initial teacher education, problems of personal change or institutional innovation are rarely considered explicitly (Fullan, 1991, pp. 300-1) despite the need for student teachers to create immediate situations where they can practice using IT, let alone embark upon the career long process of ongoing professional development through change. Fullan carried out a national Canadian survey in which only 15% of

teachers and teacher educators felt that their programmes were preparing teachers to any great extent to have the perceptions and skills to implement changes. Grunberg and Summers (1992) conducted a lengthy review of the growing wealth of literature on the subject of technological innovation and concluded that computer innovation in schools is not a topic of any great priority in initial teacher training. They argued:

“In initial teacher education the emphasis should be on developing classroom competence with information technology and encouraging student teachers to think critically about its role in teaching and learning. Problems of institutional innovation and change are far more likely to be the concern of school principals, senior managers, regional or national advisers, curriculum development agencies, and government ministers.” (p. 272)

Yet if teachers at the beginning of their careers are to develop the personal and professional skills to use information technology in their teaching, it must be recognised that they are likely to experience considerable personal change and frequently encounter a need or desire to effect organisational change also. Problems of change and innovation should not be ignored in initial teacher education. Nor, at in-service level, should they be considered only the province of senior educational managers.

Many of the barriers to the adoption of microcomputers in schools are specific examples of barriers to change in general (Cox and Rhodes, 1989). It is time that we looked at the increasing corpus of literature on technological innovation in schools (see Grunberg and Summers, 1992) and reflected on what we could do better to prepare teachers for the innovation we ask them to embark upon. As we move away from a technocentric view of technological innovation, we should look also at the substantial body of wider literature which exists concerning educational change in schools (see Wu, 1988). Teacher educators must acquire a better understanding of technological innovation and hence the enormous challenge facing the teachers they educate. All teachers should be helped towards an understanding of the phenomenology of technology innovation and of educational change so that they might better plan for their own professional development and for the development of the organisations within which they teach.

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5 BIOGRAPHY

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