

To Adopt or Not to Adopt Computer-Based School Management Systems?

An ITEM Research Agenda

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Abstract: While information systems are used in educational management by many schools in many countries, some schools in some countries use them more effectively than others. This paper questions the reasons for this. The introduction of new computer-based educational management systems in schools should be thought of in terms of innovation. Although a large amount of research has been done on the process of technological innovation some of it is not well grounded in innovation theory, and not much ITEM research relates to this topic. Of the ITEM research that does investigate innovation most is concerned with the management of change in schools and how to best implement these systems, rather than a consideration of why some schools choose to adopt some or all aspects of an ITEM system while others choose not to adopt. This paper outlines two theories of technological innovation and advocates the advantages of the theory of innovation translation in investigations in this area.

Key words: Innovation, innovation diffusion, innovation translation, technology adoption, centralised/ decentralised education systems, ITEM research.

1 INTRODUCTION

A large number of schools in many countries around the world make good use of information systems to assist them in aspects of their educational management. Some, however, make better use of this technology than others. One simplistic explanation of this has to do with the quality of the software used. Proponents of the educational management

software used in a school system in one country may claim that they have a greater adoption rate and better use of information technology in educational management (ITEM) because their software is better than that used in another school system in another country. By 'better' they may mean that it is easier to use, cheaper, has more features, or is better suited to the sort of administrative tasks schools perform. While it may well be true on one level that the quality of the educational management software available is an important factor in the implementation and use of ITEM systems, I will argue that it is not the only factor and not even the most important factor.

In this paper I will contend that the use of information technology in educational management in schools should be regarded in terms of innovation, and investigated through the lens of innovation theory. I will question the extent to which the popular theory of innovation diffusion (Rogers 1995) can be gainfully applied to researching the adoption of ITEM by schools around the world, and advocate instead the advantages of the alternative approach offered by innovation translation (Callon 1986; Latour 1986; Law 1991; Latour 1996) informed by actor-network theory.

2 INNOVATION

The dictionary defines innovation as "the alteration of what is established; something newly introduced" (Oxford 1973) and "introducing new things or methods". The word 'innovation' is used synonymously with 'newness' and 'change' (Dutch 1962), and an innovation can be described as an idea that is *perceived* to be new to a particular person or group of people (Rogers 1995). As the introduction or improvement of an information system in an organisation *necessarily* involves change of some sort (Tatnall 2002; Tatnall and Lepa 2003), in this paper I will advocate that the introduction of ITEM systems into schools should be considered as an innovation, and that theories of innovation should be given due consideration in any study of the success, or otherwise, of this undertaking. The features and quality of the management software available to schools may well be one factor in determining whether or not they will adopt ITEM systems but, as I will show, innovation is a highly political process and many more factors also influence its success. All this, however, depends upon schools having some choice in the matter.

I will digress here to distinguish between *invention* and *innovation*. Invention can be seen in the discovery of new ideas, while innovation involves putting these ideas into commercial or organisational practice (Maguire, Kazlauskas and Weir 1994). Invention does not necessarily invoke innovation and it is fallacious to think that invention is necessary and

sufficient for innovation to occur. For a formal definition of innovation I will accept that of Maquire et. al. (1994 :5): “Innovation is the application in any organisation of ideas new to it, whether they are embodied in products, processes, services, or in the systems of management and marketing through which the organisation operates”.

3 DEGREE OF CHOICE SCHOOLS HAVE IN ADOPTING ITEM

The application of innovation theory to the adoption of a technological innovation assumes that the potential adopter had some choice in whether or not to make the adoption. In some highly centralised school systems this is not the case and schools have no choice but to adopt (Tatnall and Pitman 2003). Even in these situations, however, the school system itself had some choice, and I will question the extent to which this can be investigated through innovation theory. On the other hand, in more decentralised systems the decision of whether to adopt a particular management approach or to make use of specific educational management software may be left up to individual schools. There are also, of course, many situations in between these extremes.

3.1 Centralised school systems that have adopted ITEM

In centralised school systems I will assume that the central education authority, whether it be national or regional, will have determined whether or not schools should make use of computer-based educational management systems and have specified the particular software packages to be used. If this central authority has decreed that a specific educational management system should be used then it is likely that it will also require schools to submit financial and other reports in a format determined by this system. Taking this approach will effectively force schools to adopt and use the system, but to what degree? There is an old English saying to the effect that “you can lead a horse to water, but you cannot make it drink” (Wilson 1970), and it is almost impossible to force any organisation to make effective use of a piece of software or specific management approach.

The notion of *IT infusion* (Linderoth 1997) can be used to characterise situations where the full potential of an IT innovation is being used with beneficial effects by an organisation. In studies of the use of information systems in business it is common to find an organisation that is making some use of IT, but is not getting as much out of this use as they could because they have not taken the trouble to integrate it into their management

structures and let it change the way they operate. In situations where schools are forced into the use of educational management systems an interesting research question involves the degree to which these systems are infused into the schools' management structures.

3.2 Decentralised school systems

In some cases central education authorities in decentralised school systems may suggest, or recommend to schools the use of educational management software, while in other cases it may be silent on this matter. Mostly in educational systems of this type the choice to adopt or not to adopt ITEM systems is left to the individual school (or school cluster). This presents the classic situation in which innovation theory can be applied to investigate adoption, by considering the factors and interactions in each school that led to adoption (Tatnall 2002).

4 THEORIES OF INNOVATION: INNOVATION DIFFUSION

The dominant paradigm in innovation research is that of *innovation diffusion*. In diffusion theory the existence of an innovation is seen to cause uncertainty in the minds of potential adopters (Berlyne 1962), implying a lack of predictability and of information. Diffusion is considered to be an information exchange process amongst members of a communicating social network driven by the need to reduce uncertainty (Rogers 1995). Diffusion theory contends that a technological innovation embodies information, and so its adoption acts to reduce uncertainty. The new ideas upon which an innovation is based are communicated over time, through various types of communication channels, among the members of a social system. Rogers (1995) argues that there are four main elements to innovation diffusion:

- **Characteristics of the innovation itself.** Rogers argues that attributes and characteristics of the innovation itself are important in determining the manner of its diffusion and the rate of its adoption. He outlines five characteristics of an innovation which, he argues, affect its diffusion:
 - **Relative advantage.** This is the degree to which an innovation is perceived as better than the idea it supersedes. Rogers contends that an innovation's relative advantage is positively correlated with its rate of adoption.
 - **Compatibility** – the degree to which an innovation is perceived by potential adopters as being consistent with their existing values and

past experiences. Rogers claims that perceived compatibility of an innovation assists adoption.

- **Complexity** – or the degree to which an innovation is perceived as difficult to understand and use. Rogers claims that the more complex the innovation, the less likely it is to be quickly adopted.
- **Trialability** – the degree to which an innovation may be subjected to limited experimentation. Rogers’ research suggests that if a potential adopter is able to ‘play’ with the innovation then adoption is more likely.
- **Observability**. The more the results of an innovation are visible to others, the more likely the innovation is to be adopted.
- **Nature of the communications channels**. To reach a potential adopter the innovation must diffuse through a communications channel and Rogers shows that channels involving mass media are the most rapid means of spreading awareness, but interpersonal channels are generally more effective in persuading someone to accept a new idea.
- **The passage of time**. Rogers argues that time is involved in three aspects of innovation diffusion: the innovation-decision process, the degree of innovativeness, and an innovation’s rate of adoption. He outlines the following sequential steps in the innovation-decision process: knowledge, persuasion, decision, implementation, and confirmation.
- **The social system**. Diffusion occurs within a social system in which the social structure constitutes a boundary. Rogers argues that the system’s structure affects diffusion through the action of social norms, the roles taken by opinion leaders and change agents, the types of innovation decisions that are taken, and the social consequences of the innovation.

Innovation diffusion has had considerable success in describing how innovations move, or diffuse, through large populations. It has, however not so often been used as successfully in investigating small scale implementations by single individuals or small organisations (Tatnall 2002). Also, there are occasions when diffusion does not occur at all despite the excellence of the idea or the supposed quality of the innovation, and the diffusion model finds these instances difficult to explain.

5 THEORIES OF INNOVATION: INNOVATION TRANSLATION

An alternative view of innovation is that of *innovation translation* proposed in actor-network theory (ANT). The core of this approach is translation, which can be defined as: “... the means by which one entity gives a role to others.” (Singleton and Michael 1993 :229). While many

approaches to research in technological areas treat the social and the technical in entirely different ways, ANT proposes instead a socio-technical account in which neither social nor technical positions are privileged. In actor-network theory an actor is a human or non-human entity that is able to make its presence *individually felt* by the other actors. An actor can, however, in many ways also be thought of as a 'black box' (Callon 1987), the contents of which we can choose not to worry about. We can consider this entity just as an actor, but when doing so it must be remembered that behind each actor there hide other actors that it has, more or less effectively, drawn together, or 'black-boxed' (Callon 1987). When the time comes to open the lid of the black box and look inside, it will be seen to constitute a whole network of other, perhaps complex, associations.

It is often the case that an organisation which is considering some technological innovation is interested in only some aspects of this innovation and not others (Tatnall 2002). In actor-network terms it needs to *translate* (Callon 1986) this piece of technology into a form where it can be adopted. This may mean choosing some elements of the technology and leaving out others, resulting in what is finally adopted not being the innovation in its original form, but a translation of it into a form that is suitable for use by the recipient (Tatnall 2002). When considering the implementation of an ITEM system in a school, in actor-network terms the ITEM system needs to negotiate with each individual school to determine how it could best be implemented by them.

5.1 Problematisation, Interessement, Enrolment, Mobilisation

Callon (1986) outlines the process of translation as having four 'moments' the first of which he calls *problematisation*, in which one or more key actors attempt to define the nature of the problem and the roles of other actors to fit the solution proposed. The problem is re-defined in terms of solutions offered by these actors who then attempt to establish themselves as an 'obligatory passage point' (Callon 1986) which must be negotiated as part of its solution. In implementing an ITEM system the problematisation proposed by its designer is that school administration is best performed with the assistance of a computer. For the project to be successful its instigators must convince the school to see the ITEM system as an obligatory passage point to good educational administration.

The second moment is called *interessement* and is a series of processes that attempt to impose the identities and roles defined in the problematisation onto other actors. It means interesting and attracting an actor by coming between it and some other actor (Law 1986). In the case of the ITEM

system, schools need to be convinced that this technology is more worthwhile and offers them better prospects of good administration than the approaches they now use. It must convince them to stop using manual administrative systems and instead use the ITEM system.

The third moment: *enrolment* then leads to the establishment of a stable network of alliances. For enrolment to be successful however, it requires more than just one set of actors imposing their will on others; it also requires these others to yield (Singleton et al. 1993). It is not enough for those promoting the ITEM system to eloquently espouse its benefits, the schools must also give up their old methods of administration. Finally, *mobilisation* occurs as the proposed solution gains wider acceptance (McMaster, Vidgen and Wastell 1997) and an even larger network of absent entities is created (Grint and Woolgar 1997) through some actors acting as spokespersons for others. The ITEM system can be judged to be truly successful when school principals are advocating its advantages to each other. When looked at in this way the process of adopting, or choosing not to adopt some technology begins to be seen in its true complexity, not just as a yes/no decision, but as a complex set of negotiations between a number of human and non-human actors.

6 ITEM INNOVATION RESEARCH QUESTIONS

As Smith and Wild (2001) point out, a great deal of research has been done on how technological innovation occurs. Fung (1997) notes that there is more to ITEM innovation than hardware and software, and that a process of change management is an essential factor in getting these systems accepted. It appears to me, however, that most of the research on ITEM innovation (Fung 1997; Telem and Barta 1997) does not attempt to relate this back to the established models and theories that are applied to innovation in business, but I believe that there may be value in doing so.

In an attempt to explore the usefulness of innovation theory to ITEM implementation I suggest an attempt at its application to the following research agenda:

- Why do national or local education authorities adopt (or chose not to adopt) ITEM?
 - Does the initiative come from national or regional governments wanting to make schools more accountable? (Tatnall 1995).
 - Is the situation in other countries taken into account?
 - Is what is happening in business organisations taken into account?
 - To what extent does innovation theory explain the spread of ITEM in school systems around the world? Which theory best explains this?

- In a centralised system, if an education authority has adopted ITEM (and forced its schools to adopt) to what extent is this infused into individual schools?
 - What variation occurs in levels of use and infusion?
 - Does innovation theory help to explain this? Which theory explains this best?
- In a decentralised system, why do individual schools choose to adopt or not to adopt?
 - What variation occurs in levels of use and infusion?
 - To what extent does innovation theory provide a plausible explanation?
 - Which theory offers the best explanation?

7 CONCLUSION

While some schools are forced by central education authorities to implement ITEM systems, many have to make a choice in either adopting or not adopting these systems. In this paper I have outlined two theories of technological innovation, and suggested some research questions that should be investigated.

In a research project such as an investigation of the adoption of ITEM in schools, a researcher who concentrated on the technology as the driving force, or one who ignored the affects of the technology and focus only on the human and social interactions involved would, in my view, produce a very unbalanced account. In socio-technical situations like this where the contributions of both human and non-human actors are equally important, an approach like that offered by innovation translation from actor-network theory has, I contend, much to offer. I would like to see ITEM researchers adopt a research agenda to investigate why some schools implement and infuse ITEM systems more effectively than others, and whether this differs in countries around the world.

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