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Two Computer Systems in Victorian Schools and the Actors and Networks Involved in their Implementation and Use

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ABSTRACT

As in Australia school education is the responsibility of State Governments, this article will consider two computer systems in the Australian State of Victoria. The article takes a socio-technical stance to examine two computer systems currently in use in schools in Victoria: CASES21 and the Ultranet. After describing these systems, the article makes use of actor-network theory to explore the actors involved in their creation, development, implementation and use (or in one case non-use), and the networks they established in doing so. It looks at the associations involving both the human and non-human actors and how these contributed to successful adoption and use of these systems. A comparison of two systems within the same organisational environment allows a unique perspective on the formation of networks. The ANT approach permits an understanding of the difference in adoption where very few factors differ between the cases.

Keywords: Actor-Network Theory (ANT), Computerised Administrative System Environment in Schools (CASES21), Education Department, Parents, School Administration, Schools, Students, Teachers, Ultranet

INTRODUCTION

This study is set in the Australian State of Victoria. The State Government is responsible for the delivery of education and requires each school to store administrative data relating to individual students and groups of students. For many years administrative computer systems in schools have been built around the need to handle this

large amount of administrative data. Another need for school systems is for communication with parents and for social networking, linking with other schools and students, providing information to the school community and other educational data relating to school and student performance. Data is collected from many different formal and informal sources including: student enrolments, early years interviews,

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observational surveys, running records, formal testing and other anecdotal notes (Tatnall & Tatnall 2007; Davey & Tatnall 2013).

RESEARCH FRAMEWORK AND METHODS

Many approaches to research involving socio-technical innovation treat the social and the technical in entirely different ways, either being technologically driven or socially driven, and an approach often used is to focus on the technical aspects and to treat ‘the social’ as the context in which development and adoption take place. Actor-Network Theory (ANT), which originated from research in the social studies of science in the 1980s (Callon, 1986; Latour, 1986; Law, 1986), was designed as an approach to socio-technical research that would treat the contributions of both human and non-human actors fairly and in the same way.

This research primarily involved a study of the documentation provided for the two systems. In addition to this a small number of people were interviewed to determine the range of relationships between the actors, including those interactions with the systems. Reports on the introduction of these systems including both official press reports and those from commentators were also used to identify and analyse underlying relationships. The study was motivated by the development and attempted roll out of two systems in the same school environment. This chronologically contained pair of system roll outs enabled a unique opportunity to examine networks created in one physical environment and involving mainly the same people.

TWO COMPUTER SYSTEMS USED IN SCHOOLS IN VICTORIA

This study aimed to examine two of the computer systems in use in Victorian schools: CASES21 and the Ultranet. The goal was to investigate the socio-technical aspects of these systems

and how these contribute to school community involvement, and the difference in both the nature of the translations and the networks formed during the implementations.

CASES21 Administrative Systems for Victorian Schools

In Government Schools in Victoria the principal computer system used for administrative purpose is known as CASES21 (Computerised Administrative System Environment in Schools), the use of which is mandated by the Department of Education for school administrative purposes and for reporting to the Education Department. CASES-21 aims to provide school administrative support staff with secure access to data entry and reporting modules that supports school administration and finance functions. The Department of Education claims it has been designed to be modified to meet evolving school business needs and it currently has two main modules (Department of Education and Early Childhood Development, 2011; Davey & Tatnall, 2013):

- An Administration Module that provides student administration support, including a facility to manage student and family data, student pastoral data, student medical information, student attendance, student achievement, student discipline/welfare, accident and incident data, activities (including student excursions), school management information, basic timetabling, daily organisation, and information about school associations (e.g. Parents Club and School Council);
- A Finance and Local Payroll module the purpose of which is to assist schools to create and receipt family and student invoices, manage family debtors as well as sundry debtors and creditors, manage the school’s asset register, process and manage the school’s local payroll, manage school finances and budgets, and to generate appropriate financial reports.

CASES21 allows the export of data to other systems, but does not allow data to be imported from these other systems. This means that if the same data is required for use in several different applications, unless it is entered *first* into CASES21 and then exported to the other system, it must be retyped for use in CASES21 (Tatnall & Tatnall, 2007). For security reasons each Government School in Victoria has two distinct (unconnected) computer networks: an administrative office network running CASES21, and a curriculum network for use by classroom teachers (Tatnall & Tatnall, 2007). The curriculum network is wireless enabled but not the administrative network. As CASES21 runs *only* on the administrative network a classroom teacher wanting to access CASES21 data must use a computer in the school administrative office that is connected to this network.

An earlier version of CASES has been in use since the late 1980s (Tatnall, 1995) as, some years earlier, a newly elected Victorian State Government discovered that it was impossible to get consistent financial data from its Governments Departments, as each had its own accounting system (Birse, 1994), meaning that the government was unable to obtain financial information for the State of Victoria as a whole. Consequently it decided to set up accounting standards that would be used by all Government Departments. It was then intended to institute a centralised accounting system. Further to this it was noted that only about half of Government schools had been sending in detailed expenditure statements (Tatnall, 1995). The Ministry of Education then, considering itself big enough not to need to outsource this task, in 1985 set up the Schools Administrative Computing Unit (SACU) with the task of developing suitable accounting software. The ultimate result was the Computerised Administrative Systems Environment in Schools (CASES). Some years later this developed into CASES21. The original version of CASES was developed with the prime purpose of becoming a tool for overall school administration and as a means of reporting back from schools to the

Department of Education and so to the State Government. No consideration was given to its use in school classrooms either to support teacher administrative functions or to enhance teaching and learning (Tatnall, 1995; Tatnall & Davey, 2001; Davey & Tatnall, 2003).

The Ultranet

Traditionally in Australia, as in many other countries, parents have been informed of their children's progress at school through the use of school reports, parent-teacher evenings and an annual 'Open Day'. All parents want to know both what their children are doing at school and how well they are progressing. They want to know as much about the school, where their children spend so much time, as possible, and in many cases would also like to be involved in some of the school's activities, whether this means going as a helper on a school excursion, serving in the school canteen or doing some clean-up activities in the school yard over the weekend (Tatnall & Dakich, 2011).

Several years ago the Victorian Government conceived an online system for informing parents and school communities about their school, using web-based technology – the Ultranet. It would support knowledge sharing across Victorian Government Schools and also provide facilities for informing parents and for curriculum delivery and online learning and teaching (Department of Education and Early Childhood Development, 2010e; Tatnall & Dakich, 2011).

The Ultranet is the result of many years of work, beginning in 2004 as a plan by the Department of Education and Early Childhood Development (DEECD) to research the development of a project to produce a 'proof of concept' student-centric ICT system, "... to support online teaching and learning, curriculum delivery and knowledge management in Victorian government schools." (Griffin & Woods 2006; Department of Education and Early Childhood Development, 2010a; Tatnall & Dakich, 2011). The Ultranet was launched

in September 2010, designed to provide facilities for informing parents about their children as well as for curriculum delivery and online learning and teaching (Department of Education and Early Childhood Development, 2010e). The Victorian Government's Department of Education and Early Childhood Development described the Ultranet as: "*a student centred electronic learning environment that supports high quality learning and teaching, connects students, teachers and parents and enables efficient knowledge transfer.*" (Department of Education and Early Childhood Development, 2010c).

The Ultranet was designed to support knowledge sharing across the 1,555 Victorian government schools with their 540,000 students and 40,000 teachers (Australian Bureau of Statistics 2010; Department of Education and Early Childhood Development, 2010b). It has many of the features of a business extranet in that it is closed to people outside the Victorian government school community and requires a username and password to gain access. It was thus designed as a closed, secure place on the Internet, accessible by students, teachers and parents from the school community, offering a space that students, parents and teachers could connect to anywhere, anytime they have access to a computer. One major difference, however, is that with over half a million users, the Ultranet is larger than most business extranets (Tatnall & Dakich, 2011; Tatnall, Michael, & Dakich, 2011; Davey & Tatnall, 2013).

The concept was that by using the Ultranet teachers would be able to create curriculum plans, collaborate with other teachers, monitor student progress and provide assessment. The Ultranet was also designed to assist parents in gaining benefits of flexible access to student information and school resources that would help them keep up-to-date with their child's learning with attendance records, test results, timetables, learning progress, homework activities, tasks and feedback so providing a way for parents to support their child. These features

were intended to strengthen and extend parental involvement in schools and so result in richer more holistic and better negotiated approaches to student learning (Davey & Tatnall, 2013).

The Ultranet has many of the features found in learning management systems such as Blackboard and Moodle but was designed not just for this purpose but for three principle uses:

1. To allow students to access personalised learning activities and to keep an ongoing record of these activities using learning portfolios and online communication tools such as wikis, blogs and discussion boards;
2. To allow teachers to create curriculum plans, collaborate with other teachers, monitor student progress and provide student assessment;
3. To allow parents to see information that would help them keep up-to-date with their child's learning.

The Ultranet makes use of objects it calls Spaces, which are of three types, determined by accessibility: 'Me' spaces (accessible only by the owner), 'We' spaces (seen by anyone with permission) and 'See' Spaces (open to the public). The content of the Ultranet is organised into the following spaces: Home, eXpress Space, Design, Community, Collaborative Learning, Learner Profile, Learning Tasks, My Content and Connect (Department of Education and Early Childhood Development, 2010d; Tatnall, Michael et al., 2011).

The Ultranet has, however, not been widely adopted around the state (VAGO, 2012) and was used by only a select group of schools. One major relevant issue that emerges here on why the Ultranet has not been a success is the change of State Government in late 2010. The new government did not have the commitment to the Ultranet that did the previous government, and largely looked at the \$60M spent on the project as a waste of taxpayers' money. When asked whether the change of government had

made a difference to adoption of the Ultranet, the Principal at one Primary School remarked that: "it made all the difference" as the new government has shown little commitment to the project.

Despite the large amount of money spent on developing it, in an email to School Principals on 28th June 2013, the Department of Education and Early Childhood Development announced that it had signed an agreement with NEC to facilitate the continued provision of the Ultranet to schools on an individual user-pays basis (Department of Education and Early Childhood Development – Victoria, 2013) from January 2014.

ACTOR AND NETWORKS IN THESE TWO SYSTEMS

The first steps in any ANT analysis are to identify and 'interview' the actors. In the case of the human actors this is fairly straightforward, but in the case of the non-humans it involves asking other actors, examining documentation and observation. We will now look at the actors and their interactions involved with each of these two systems.

CASES21 – Actors and Networks

In this case the human actors are seen to include School Principals, school administrators, Education Ministry staff, systems developers and IT maintenance staff. Neither teachers nor students nor parents can be seen as actors as they have no interactions at all with the CASES21 system other than benefiting from its output. The non-human actors are CASES21 software, school admin computers, broadband links and the Victorian State Government.

When the first version of CASES was implemented in schools, some schools questioned whether this system was intended to assist or to control them (Tatnall & Pitman, 2002; Tatnall & Pitman, 2003). Whereas previously they had been able to keep their own financial and student records in their own way, now they would

have to use a common system provided by the Education Ministry (Tatnall, 1995) and there was a feeling that 'Big Brother' was watching them. As the use of CASES and then CASES21 was required for schools to report back to the Education Ministry schools had no choice but to adopt it. The extent to which they made optimum use of it did, of course, vary somewhat.

The system was sponsored at the political level where the Minister in charge felt a growing need to be accountable for expenditure on education. Perusal of press reports shows that the Minister considered the data available to be fragmented and so a close partnership developed between the government and proposals for software that would make accountability for expenditure possible. In this sense the determination of the Government and the extent of advertising of their need to 'justify the expenditure of tax money' gave this actor power.

The software technological actor was also powerful in that hardware and software were supplied free to schools. Users were to be the finance officers in each school and the software was designed with their needs in mind, hence providing a strong bond between technology and office staff.

Possible translations were for the software to become an agent of 'big brother' or for the software to be seen as a state supplied aid in the management of schools. Despite some early problems with the software the dominant translation was of a management tool for both Government and schools.

The Ultranet – Actors and Networks

A study of the Ultranet will, of necessity, need to look at the contributions and interactions of human actors but also at those of non-human actors including the technology itself. Before the Ultranet became available to schools, the researchers who worked on the project that led to the Ultranet should be seen as actors, along with the Victorian Government of the time that approved the project and the system

developers and programmers. After release of the system to schools, new actors included State Government policy makers, Students, Teachers, Parents, Principals of Government Schools, School Councils, Teacher Educators and Pre-Service Teachers. Many non-human actors were involved as well: Broadband Connections, Web 2.0 technologies, Schools, School Computers, Home Computers, the Victorian Institute of Teaching and Learning (VIT), the emerging National Curriculum, policies, privacy laws, DEECD, the Victorian Government (- this was a new Government from the time the system was developed) and the technology of the Ultranet itself (Tatnall & Dakich, 2011; Tatnall, Dakich, & Davey, 2011). Another significant actor was the Australian Education Union which opposed use of the Ultranet during a pay claim (Tatnall, Davey, Dakich, & Wickramasinghe, 2013).

Many of these actors can, in fact, probably be broken into finer groupings by opening their black boxes. For example Teachers may devolve into such actors as: Teachers who want to use the Ultranet to promote their own agenda, Teachers who make limited use of the Ultranet, Teachers who work to belittle the value of the Ultranet or Teachers who are over-enthusiastic about the Ultranet to the extent that they neglect other aspects of teaching.

When it was first implemented our research suggested that the Ultranet could undergo a number of intended and unintended translations into any of the following forms (Tatnall, Dakich et al., 2011):

1. A platform for monitoring student progress (within schools or between home and school);
2. A vehicle for teacher collaboration and professional development;
3. More active involvement of parents in the lives of schools;
4. Social networking and new learning platforms for students;
5. Community networking for community directed education.

As it turned out, however, none of these translations really occurred to any extent.

AN ANT ANALYSIS OF THE IMPLEMENTATION AND USE OF THESE SYSTEMS

Relationships between Actors: Systems Developers and Government

CASES was originally conceived, designed and built in the late 1890s by the Schools Administrative Computing Unit (SACU) on the direction of the Victorian State Government as a means by which the Government could obtain better financial information by use of a centralised accounting system for all schools. CASES was thus developed with the prime purpose of becoming a tool for overall school administration and as a means of facilitating the reporting back from schools to the Department of Education (Tatnall, 1995).

Development of the Ultranet followed research, beginning in 2004, by the Education Department for production of an online system for informing parents and school communities about their school. To test the feasibility of this idea and to establish whether such a project was viable, a 'proof of concept' student-centric ICT system, called the Students@Centre trial (DEECD, 2010) was developed by the University of Melbourne and trialled in 22 schools in 2006 using a version of the software provided by a commercial supplier (Griffin & Woods, 2006; Department of Education and Early Childhood Development, 2010a; Tatnall & Dakich, 2011). This project aimed to determine functional requirements for the system and to identify any possible user and technical issues.

Relationships between Actors: Schools and Government

The relationship between government and teachers can be seen as being instrumental in

the fate of the two systems. CASES21 was constructed firstly to provide a single means of gathering data required by government from schools. In the knowledge that schools saw themselves as having significant data needs, the first version changes in CASES were to include modules that answered local school needs for the data being collected by government. In this way CASES began ‘co-operating’ with schools and teachers.

The Ultranet sought to involve teachers as part of the value of the system, but had the problems of both providing little help to teachers in their daily work, and exposing them to local accountability to school administration and parents that they had not experienced before. An ANT approach to this investigation considered all interactions between these actors as significant. Perhaps one of the most significant interactions resulted with a change of Government. This could be considered as an old actor leaving the network and the entry of a new actor that did not see the value of the system in quite the same way. Possible translations of the system were available at the change of government but the new party did not provide support for any particular translation and left the other actors to decide the fate of the system. This ‘stepping back’ of a previous sponsor of the system increased the strength of all other relationships by default.

Relationships between Actors: Schools, Principals, Teachers and Teacher Unions

Teachers in Victorian state schools are represented by the Australian Education Union (AEU), and as part of a long running enterprise bargaining and pay dispute the AEU banned use of the Ultranet by teachers (Australian Education Union – Victoria, 2012). Although not all teachers heeded the ban, it had a large impact on the use of the Ultranet in 2012 and 2013 (Tatnall, Davey et al., 2013). This dispute had no impact on the use of CASES21. A possible explanation

is that CASES21 did not affect the daily lives of teachers, but only school Principals. If there had been industrial action by School Principals then perhaps this would have had an effect on CASES21, but this did not happen.

Relationships between Actors: Teachers and Parents

Our research showed that teachers see parents in several different contexts depending on the relationships they have with the school:

- 1 Enthusiastic parents who want to be part of the school and its activities;
- 2 Parents who see the teachers as domain experts who should take sole responsibility for student’ learning experiences;
- 3 Those disinterested parents who see the school largely as a ‘child minding’ centre.

These relationships are very relevant to the implementation and use of the Ultranet, but not CASES21 as parents and teachers have no interactions with this system. The CASES21 system has an impact on parents to the extent that the system provides the school with fast access to important information (from the Education Department). A parent who, as the result of a court injunction does not have visiting rights for a child will be turned away at the school front desk. Likewise a student with a chronic medical condition will be properly treated by the school as the result of a single CASES21 query. To this extent CASES21 supports the relationship of professional and client.

The Ultranet seeks to involve parents much more closely with schools and to reduce the communications boundary between teachers and parents. Teachers could then become more aware of home circumstances and occurrences with little effort if parents were enticed to use the system. In our interviews, however, many teachers saw the system as being an extra workload burden in which they saw little value. Because

of this view of the system they contributed little to what other users could see. Parents were not able to see anything on the system that would entice them to look, let alone contribute. This meant that the relationships between teachers, parents and the Ultranet were quite weak.

CONCLUSION

CASES21 was developed for accountability purposes to facilitate reporting from schools to the Department of Education, and its mandatory use meant that schools had no option but to adopt and use it. The system was introduced with significant effort to make it useful to end users as well as the sponsor. The introduction of CASES21 was completed within the rule of a single political party. The Ultranet was designed to enable schools to better communicate with parents, to improve communication between schools and students and to create a mutually supporting educational community as well as to improve learning. The level of its use was completely at each school's discretion. Although provided as a web enabled technology there was little intrinsic value included and an implicit assumption that the features of the software would be implemented as envisaged. Teachers did not see the intended features as part of their preferred translation and hence did not use the features in any effective way across the system. Isolated examples where the technology was embraced showed that the software could be used as intended but uptake was very poor.

Unless use of a system is required in schools, its use will relate to whether schools see some value in its use. The question then arises: What makes a system valuable? If it is seen as having value for its users it is likely to be adopted. Unfortunately the Ultranet was not seen as having enough value to have been worth the effort teachers and parents would have had to expend in order to make good use of it.

This study showed that the environment of a system roll out is not a determining factor

in adoption. It also shows that the nature of the technological actors can determine if an intended translation becomes the dominant pattern of adoption.

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