Kids Are Kids! A case study of collaborative ICT acceptance and use

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Abstract

This paper examines acceptance and use of information and communication technologies (ICT) within a small non-profit, community based health care organisation.   The study described involved a longitudinal multi-method investigation of technology acceptance and use, collecting quantitative and qualitative data over a 6-month period.   The results of this study suggest that traditional models of acceptance may not adequately capture the dynamics of technology acceptance in small non-profit organisations within the health sector. The data illustrates the importance of context, people, organisational and systems issues in the use and acceptance of ICT, and the dynamic interaction which changes over time.   The key finding from this research suggests that ICT not only supported collaboration, but that the collaborative nature of the organisation was at the core of the success of the information system implementation.   The significance of this work and the theoretical and practical implications of the findings are discussed.

1   Introduction and Background

Collaborative adoption and use of information and communication technologies (ICT) is often applied to technologies that enable the collaboration of individuals and organisations that are geographically dispersed.   However, ICT can facilitate collaboration within organisations that are not geographically dispersed with equally significant outcomes.

Working in teams in multi-disciplinary environments is commonplace within the health sector, where health professionals work together, applying the skills and knowledge of their respective disciplines, to improve the health and wellbeing of individuals and their families.   It is an

environment often characterised by high-levels of activity, high work-loads, stress and risk; and one where collaboration and the sharing of information and knowledge is crucial in achieving positive outcomes. Collaboration is also necessary within these groups for the many administration and management-type tasks which form part of their roles.

The use of ICT by health professionals to facilitate collaboration and communication within multi-disciplinary teams is a topic yet to be explored in the literature. The paucity of literature is perhaps due to the broader issue of acceptance and use of ICT within health; as traditionally the health sector has lagged in its adoption and utilisation of ICT and health professionals have not fully embraced the valuable resource of ICT [1-5].

The research described in this paper is part of a larger study on acceptance and use of ICT within health. While the case study was not originally envisaged as a study on collaboration per se, the results demonstrate how ICT supported collaboration and how collaboration was key to the success of the information system (IS) implementation

2   The Research Model

Various theoretical models have been devised to investigate technology acceptance. The research model employed in this study (Figure 1) is being concurrently tested in a much larger study of health professionals across a major part of Australia's allied health sector [6, 7]. It draws on findings from relevant prior research and is primarily based on the UTAUT model [8] and on the generic framework for technology acceptance proposed by Chau & Hu [9]. For a full discussion of the development of the research model see Schaper et al. [6, 7]. The UTAUT model was adapted for this research due to the comprehensiveness and rigour applied in its development and its high explanatory power, while Chau & Hu's framework [9] was adapted for this research due to its applicability to acceptance within the health sector and for its provision of contexts which assist a systematic examination of technology acceptance that can be targeted for recommendations to various stakeholder groups.

The research model theorises that technology acceptance has three dimensions: 1) characteristics of the individual; 2) characteristics of the technology; and, 3) characteristics of the implementation context. Variables such as age, gender, clinical speciality and workload moderate the key relationships in the model. The characteristics of individual users are grouped within the individual context. The technological context refers to the characteristics of the technology itself and is made up of two determinants – performance expectancy and effort expectancy. The implementation context refers to the specific professional environment of the user and includes the determinants of social influence, organisational facilitating conditions and compatibility. It is the implementation context which is theorised to have the predominant influence on user acceptance, as it is within this dimension that organisational and social issues are examined and, importantly, the compatibility of the technology with the clinical priorities of delivering positive outcomes for clients.
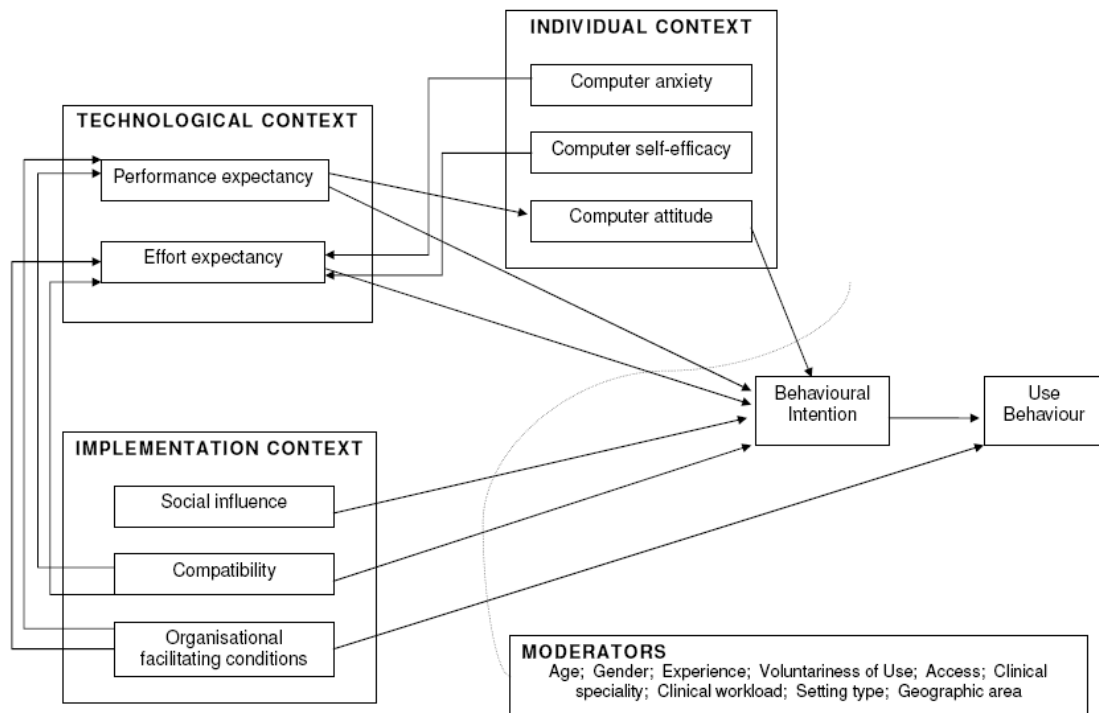
Figure 1: Research Model

3 The Case Study

This case study examines technology acceptance and use and the associated individual and organisational impacts within a small non-profit, community-based health care organisation.

3.1 The Organisation

Kids Are Kids Therapy and Education Inc (KaK) provide specialised therapy and education services for children and families. The mission of the organisation is to "provide a caring, trusting and holistic environment in which to work with children and their families to enhance family well being" [10]. They aim to contribute to the overall development of children with educational and therapeutic needs in order to maximise inclusion into the mainstream education system and wider community.

KaK was established in 1997. It is an independent, not-for-profit, community-based organisation. The organisation consists of a Board of 11 members, a 3-person management team, 3 occupational therapists, 2 physiotherapists, 3 speech therapists, 1 psychologist, 1 therapy assistant, 3 administration personnel and numerous volunteers who manage the day to day operations of the organisation. Of the 16 paid staff members, only 5 are full-time employees. KaK is predominantly dependent on Government funding. They receive Federal,

State and Local Government grants, which are reviewed each year. They also receive fees from fee-for-service clients, as well as memberships, donations and fundraising efforts.

3.2 Background to the KaK IS Implementation

In 2004 KaK was awarded a AU$40,000 Information Technology (IT) Grant. The purpose of this grant was to fund a complete overhaul of the existing IS infrastructure. KaK employed a consulting group to perform an independent needs assessment, to review existing infrastructure and to recommend changes which were intended to support the long-term IT capability of the organisation.

3.3 Pre-Grant ICT Infrastructure

The pre-grant infrastructure at KaK was vastly inadequate and did not meet the organisation's needs. The entire organisation had only three computers which were running Windows 98, each with 64Mb RAM and 1 Gig hard drives. The main office was connected to the Internet via a single dial-up connection. Email accounts were individually paid for through the ISP and only one computer had access to the Internet and email. There was no network in place and no firewall structure. The inadequacy of the existing infrastructure meant that staff were often not able to gain physical access to a computer; were not able to share resources; most didn't have access to email or the Internet; and computers would often 'crash', resulting in lost changes to documents and inability to access previously stored work.

3.4 An Overview of the 'New System'

The IS implemented at KaK refers to the entire system, as changes were made to every aspect of the existing infrastructure. This included substantial changes to hardware, software, data and networks. The changes included 7 new workstations and 3 laptops (running Windows XP and the full Microsoft Office suite), an Exchange server, an internal network and a Broadband Internet connection for all computers.

The goal of the new IS was to transform the organisation and the existing processes. KaK underwent a major undertaking, installing all elements of the new system over a weekend. When staff returned to work on the Monday, they were given a 3-hour group training session and were faced with major changes to their computer and communications infrastructure and related processes.

4 Methodology

To gain an understanding of technology acceptance and use over time, a longitudinal multi-method field study was designed to examine ICT acceptance and use and the associated individual and organisational impacts of use or non-use.
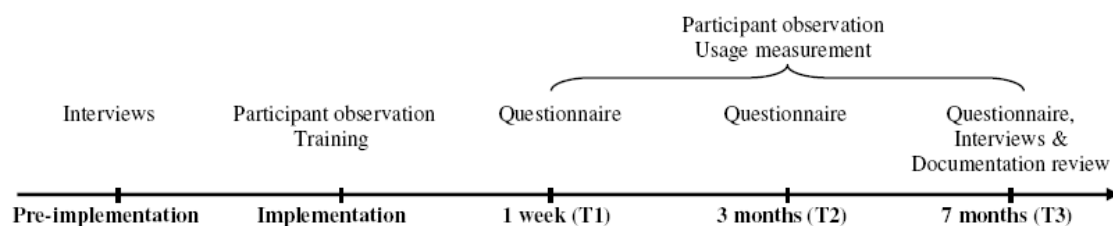
Figure 2: Data collection schedule

4.1 Data Collection

Data collection was longitudinal over a 7-month timeframe, timed in conjunction with the introduction and use of the new computer system at KaK. Methods of data collection included questionnaires, interviews with members of the organisation, participant observation and a review of documentation. In addition 'Time-use' software was employed to capture actual computer use by individuals. Figure 2 presents the longitudinal data collection schedule.

5 Results and Discussion

Of the 16 individuals employed at KaK, 14 consented to take part in this research. During the course of the study, 3 people resigned and the organisation created new positions and employed several new staff. This paper reports an analysis of responses from 9 staff, 8 of whom were at KaK for the entire duration of the research and 1 of whom started 5 weeks after implementation of the new system.

5.1 Technology Use

The use of ICT at KaK increased dramatically over the 7-month duration of this study. All participants reported an increase in frequency and extensiveness of use. While management staff reported a 60-250% increase in their use of computers, therapists reported a 100-150% increase, as shown in Table 1.

As part of the new system the organisation provided individual email accounts for all staff and directed that staff use the calendar feature in Microsoft (MS) Outlook. The summary data provided in Table 2 shows that 78% of participants reported an increased use of email and MS Outlook calendar.

Participants use computers for a variety of clinical, administration and professional purposes. Since implementing the new system: 67% of participants reported an increased use of computers during client interventions (i.e. as a tool in therapy); 78% increased their use of ICT to communicate with clients and/or families; 67% increased their use of computers to document client information and to schedule client appointments; and 56% increased their use of ICT for

continuing professional development and education. 100% of participants foresee an increase in the use of ICT in their work in the next 5 years and 88% believe ICT can add positive value to their work.

Table 1: Staff perceptions of time spent using computers pre- and post- implementation[1]

Position	Pre-Implementation (% of work day)	Pre-Implementation (% of work day)	% increase
Therapy assistant	10	37	270
Therapist	10	25	150
Therapist	10	25	150
Therapist	15	30	100
Mngmt/Therapist	30	60	100
Mngmt	50	80	60
Mngmt	20	70	250

Notes: 1 - both measurements taken at 7 months post implementation

(n=7; N/A for person who started post-implementation; 1 not answered)

Table 2. Staff Perceptions of Increased Use of Software

Software / Program	Self-perceived Increase (9 staff)
TOTS (Kids Are Kids client management system)	8 (88.9%)
Organiser / calendar software	7 (77.8%)
Email	7 (77.8%)
Graphic programs eg Photoshop	6 (66.7%)
Word processing programs	4 (44.4%)
Presentation programs eg PowerPoint	4 (44.4%)
Therapy related programs eg Boardmaker	2 (22.2%)
Spreadsheets eg Excel	2 (22.2%)
Financial & administrative systems eg MYOB	2 (22.2%)

All staff have learnt new ways of using computers in their work. Examples observed by the researcher and reported by participants include: i) Clinical purposes, e.g. including digital photos and scanned images of a child's handwriting into a report that is saved in PDF format and emailed to the relevant external agencies; ii) Administrative purposes, e.g. utilising a laptop and data projector for staff meetings; and, iii) Therapeutic purposes, e.g. creating a PowerPoint presentation for a child as a motivating tool to improve hand-eye coordination and communication.

Prior to system implementation, Ian, a volunteer at KaK, began development of a client database. It was originally envisaged as an administration tool which would assist management by generating comprehensive reports needed to maintain and attract further funding. This database has evolved into 'TOTS' (KaK Therapy Online Tracking System) and is now used by all therapy and management staff. With further planned development, it will become a complete electronic client record.

5.2 Technology Use and Collaboration

A common 'complaint' with the previous infrastructure at KaK was the inability to easily share information and resources with each other. To address this problem a 16 port, 100Mbps high speed local area network was installed as part of the new system. This, combined with access to individual email accounts, has been fundamental in facilitating and enhancing the collaboration and sharing of information amongst the team. "*Before, it was just too hard. You would have to sit at someone else's machine and look for the information, because everyone stored their documents differently, and then - if you found it - you would have to save it onto a floppy ... it just took ages.*" The enthusiasm by staff for using email and the network to collaborate was immediately visible following training and in following observations. New procedures for storing and naming electronic files were formulated and staff spent many hours migrating their old files to the new system. Staff report that this has saved them time, increased their ability to share resources and enabled them to more easily 'keep track' of therapy interventions performed by other team members. With the majority of staff employed on a part-time basis there are limited opportunities for face-to-face contact, hence the ability to share information over the network has been very successful.

To improve productivity and efficiency, some work processes have become automated with the introduction of the new IS. One example of these is the use of MS Outlook Calendar which enables all staff to book appointments with clients and with each other and acts as a record of services provided. During interviews, staff were asked what they believed were the main benefits of the new system for them personally and for the organisation; almost all interviewees responded with "(MS) *calendar*". Although this may seem like a minor benefit to an external reviewer, the staff at KaK are unanimous in their praise for this feature which they state has substantially decreased their time spent in administration duties.

5.3 Technology Acceptance

Due to the small number of cases, statistical significance of the direct paths in the research model is unable to be determined, as is the impact of moderating variables. However, raw survey data and qualitative data collected during the course of the research lends support to the following model constructs:

- Attitude - raw data from the questionnaire (T1 average (ave) = 6.09), in addition to observation and interviews, illustrates all participants to have a positive attitude towards

the new system.   The positive attitude of staff surprised one interviewee who stated "*(I'm) surprised staff have taken to it as well as they have.   They've been really positive and taken it on board*".

- Anxiety - participants reported varying levels of anxiety towards using the system and was not observed or reported (T1 ave = 2.88) to directly influence system use.

- Self-efficacy - The raw data (T1 ave = 4.47) indicates low-medium levels of computer self-efficacy for the majority of participants.   This appeared to have little impact on use.

- Performance expectancy - A commonly cited benefit of the new system by staff is improvements in work productivity and efficiency (n=8, 88.8%).   This was also reflected in the raw data on performance expectancy (T1 ave = 5.84).

- Effort expectancy - (T1 ave = 5.09).   There was much variation within the organisation as to the pre-implementation level of ICT knowledge and skills.   Some staff quickly became skilful while others continue to experience difficulty.   However, this variation does not appear to effect use of the system and it is possible that the effort required to learn and use the system is not a reliable indication of use.

- Social influence - although not receiving a high raw score (T1 ave = 4.97), *"peer pressure…in a good way"*, was cited by an interviewee as a factor contributing to ICT use at KaK.   Many interviewees also referenced the ability to ask other staff for assistance as a factor contributing to their use of the system.

- Compatibility - the research model hypothesises that compatibility, the degree to which an innovation is perceived as being consistent with the existing practices, values, needs and experiences of the health care professional, is a key variable influencing acceptance and use.   In support of this, high scores were attributed to the raw data (T1 ave = 6.22).   Qualitative data suggests that a key specific feature of the IS at KaK that impacted system use and outcomes are its ability to meet individual and organisational needs and to enhance staff ability to carry out their core functions and maintain the goals and objectives of service delivery.

- Organisational facilitating conditions - All interviewees attested to the support given to them by the management team.   There was a unanimous belief that management *"did their best"*, were supportive and encouraging and made themselves available to assist staff and answer their questions.   Again, this is reflected in the high raw data score (T1 ave = 5.78).   Conversely, the provision of training, resources and time to gain the knowledge and skills necessary to use the new system is also a part of this construct.   It was widely acknowledged by all interviewees that the training provided to staff was inadequate and that provisions should have been made for allocating staff time to learn the new system and to transfer their data.   However, it is possible that these potential barriers to acceptance and use did not pose barriers due to other contributing factors, as outlined below.

5.4 Other Factors Which Contributed to Acceptance and Use of the 'New System'

Analysis of the richness of the qualitative data collected throughout the research period has revealed additional factors which contributed to acceptance and use of the new system.

- Gender - KaK is a female dominated organisation. With the exception of one volunteer (Ian) and a part-time psychologist (who was not available to take part in this study), all employees are female. While gender was not a focus of this study, it is hypothesised to be a moderating variable in the research model. It is important to note that allied-health organisations are often female dominated and this is an important factor to investigate in future acceptance research in the health sector.

- IT support - Although Ian's support could be included under OFC, it deserves separate mention. Ian's volunteer role at KaK has extended to a virtually full-time position. He is constantly on-hand to answer staff questions and to trouble-shoot technical problems. All staff have grown reliant on his presence and the CEO attributed the success of IS implementation to him. This attests as to the importance of IT support in contributing to use and acceptance.

- Computer access - access is a moderating variable in the research model. Although unable to be quantitatively measured, the majority of staff cited the ability to access a computer when needed as a key feature of their increased use of ICT.

- Funding - As a non-profit organisation, predominantly reliant on Government funding, all staff are acutely aware of the constant financial and resource constraints. As a result, staff were appreciative of their *"windfall"* and were excited about *"entering the Information Age"*; as one staff member stated *"if we don't have this, we don't have anything"*. This added to staff motivation to use the new system.

- Other individual characteristics - All participants were asked to describe why they and others persisted in their use of the system when faced with continual technical problems and other barriers. The responses were concisely captured by one who stated *"Bloody-mindedness!...We are all pretty persistent, dogged and determined. We've gone this far and we've made the commitment, and we (know) we can do it"*. These individual characteristics of persistence and determination may be worth including in future technology acceptance studies.

- The collaborative nature of the organisational culture. The structure and culture of an organisation may influence acceptance, use and IS success. This has been particularly evident at KaK. Although the organisational chart shows some hierarchy in the organisational structure, the organisation fosters a unique sense of community amongst staff and volunteers. They provide services as part of a multi-disciplinary team. All staff contribute to the decision-making process and can be involved as much, or as little as they choose, in the operations of the organisation. Acceptance and use of the new system was viewed by staff as an opportunity to enhance the service provided to KaK

clients and their families and their motivation highlights staff commitment to the organisation, its missions and goals.

Many of the above factors were captured in the following statement…

> *"It's probably the nature and the underlying philosophy. We face constant challenges in everything we try to do - just getting this place up and running and keeping going. We've had knock backs and rejections and (people saying) 'well you're not supposed to be doing that', and we do it anyway; and (lots of) obstacles along the way. Because the core group of us are very strong and very committed to what we are doing ... we expect and anticipate that there are going to be problems, there are going to be obstacles... but that's the culture, in terms of 'fine' we'll take a break, take a breath and think 'ok' what are we going to do? We don't (think) 'oh its all too bloody hard' and give up. It's not in our nature... let's look at some good old fashioned OT-problem solving; and having that, we break it down (to what needs to be addressed and how can we do it, can we call on someone for help etc). (We have also managed to) link into people that can help us... deal with those difficulties and challenges."*

Many of these factors were not included in the original research model. It is recommended that future technology acceptance research and models be extended to include these variables.

5.5   Organisational Outcomes

One of the outcomes of the acceptance and use of the new system at KaK has been the realisation of benefits. Despite the technical difficulties, staff perceive strong and ongoing benefits to them, the organisation and to their clients in continuing to use the system. Participants cited a range of benefits of system use, of which they key ones were:

- Improved communication and responsiveness between KaK staff;
- Allowed a more integrated approach and better management of client records and associated documents;
- Increased organisation of, and access to, information;
- Increased the ability to analyse client data and service data;
- Increased productivity and efficiency;
- Improved the service provided to the client and their family;
- Increased accessibility to computers and Internet;
- Increased the consistency and cohesiveness in service provision; and
- Increased job satisfaction.

Other benefits mentioned include:

- Enabled an increase in the time spent with clients;

- Decreased amount of 'down time' (time unable to be charged);
- Reduced workload;
- Improved communication to external agencies;
- Experience of a personal sense of satisfaction, learning new ways of using ICT in the various clinical, administrative and therapy tasks;
- Enhanced security of information;
- Less individual stress;
- Provides the resources for the organisation to produce their own brochures and information packs; and,

There is a shortage of allied health therapists within Australia. The management team at KaK are hopeful that this change to their IS infrastructure will act to give them competitive advantage in employing and retaining staff.

The IS will increasingly be used to decrease operational costs. For example, the Internet is being used as a tool to help produce resources; all photocopying and printing is done in-house; and staff are using email to communicate which has decreased expenditure on phone calls.

The focus at KaK is on the quality of service they provide to clients and their families. One of the major benefits of the IS cited by KaK management and staff is that the new system has provided a more consistent, cohesive, integrated approach to service provision and better management of client records and associated documents.

One of the unexpected outcomes is that acceptance and use of the system has contributed to changes in organisational culture. ICT is now seen as an essential tool and staff have become reliant on its use. IS failures have resulted in staff dissatisfaction and claims being made that they 'can't do their work'.

6 Conclusion

This paper examines ICT acceptance and use and the associated individual and organisational impacts within a small non-profit, community based health care organisation. The case study described involved a longitudinal multi-method investigation, collecting quantitative and qualitative data over a 7-month period, timed in conjunction with the implementation of a new information system. The paper also presented a proposed research model of acceptance and use which is concurrently being validated amongst a sample of 2000[+] health professionals.

Results from this study demonstrate qualitative support for the research model. The data elaborates on the constructs contained in the model to provide a comprehensive analysis of the factors influencing technology acceptance and use and the links between acceptance and use with the outcomes and impacts of use on individuals and the organisation. Results highlight the invaluable role of individual commitment to the organisation and collaboration amongst team members as contributing to the success of the IS implementation. Results also verify

how the use of ICT to facilitate and enhance collaboration was seen as one of the major benefits of the new system. The importance of qualitative methodologies in information systems research is demonstrated.

Acknowledgements

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