Innovation within an Early Childhood Education and Care Organisation: A Tri-Perspective Analysis of the Appropriation of IT

Melinda Plumb and Karlheinz Kautz
Faculty of Business, University of Wollongong
Wollongong, Australia
Email: map016@uowmail.edu.au, kautz@uow.edu.au

Abstract

Empirical studies on information technology (IT) in early childhood are scant, despite an increasing number of early childhood education and care organisations choosing to innovate with IT. This paper presents a framework to understand the appropriation of IT as an innovation within such an organisation. The framework consists of three perspectives on innovation: an individualist, a structuralist and an interactive process perspective. While the first focuses on concepts such as leadership, IT champions, previous IT exposure, the second focuses on organisation size, parents as stakeholders, competitors, government compliance and regulatory requirements. The third perspective views the innovation as a dynamic, continuous phenomenon of change, produced by the continuous interaction of the innovation content, its context, and the appropriation process as related in an interactive process. We demonstrate the framework's applicability and determine that the three perspectives supplement each other and together provide a deeper understanding of the IT appropriation process.

Keywords: IT appropriation, early childhood, educators, innovation

INTRODUCTION

The number of early childhood education and care organisations who are innovating with information technology (IT) is increasing, with interest and support for IT to be integrated into policy, curriculum and practice (Bolstad 2004; Barron et al. 2011; Palfrey and Gasser 2008, Preston and Mowbray 2008, Spears 2009 cited in Bourbour et al. 2014). To date there have been few empirical studies on IT in early childhood education and care organisations. Plumb et al. (2013) found that the majority of existing research involves descriptive studies of use by the educators with the children and pedagogical benefits of the use of the IT as a teaching and learning tool with young children, interspersed with a few studies examining the acceptance of the IT by children and/or educators. The diversity of research in terms of theory and methodology is limited, as these studies have mostly relied on traditional individual-level adoption theories such as the Technology Acceptance Model and Diffusion of Innovations (see for example Al-Qirim 2011, 2012) and primarily focus on individual factors, although some studies make additional mention of organisational structure, environmental and contextual influences (e.g. Clark and Luckin 2013; Crichton et al. 2011). The studies employ these theories in a quantitative manner and provide useful information on factors and their contribution to the outcome of technology adoption, but these studies of correlates of variables neglect the "often messy process through which teachers struggle to negotiate a foreign and potentially disruptive innovation into their familiar environment" (Zhao et al. 2002 p.483). As Schroeder et al. (1986) note, many studies of innovation focus on the facilitators and inhibitors to, or outcomes of, innovation in a given setting, but few examine how "innovations emerge, develop, grow or terminate over time" (p.501-502). This research aims to move beyond simply examining the adoption factors of IT; instead we undertake to understand the process of appropriation, "the way that users evaluate and adopt, adapt and integrate a technology into their everyday practices" (Mendoza 2010 p.6) of IT as an innovation within an early childhood education and care organisation.

THEORETICAL BACKGROUND

The word *innovation* is used to describe an object, idea or process that is new, such as a new IT device; however it is maintained that it is not whether an object or process is *new* to an environment, rather it is the *perception* that it is new by the adopting unit (Cooper and Zmud 1990; Rogers and Shoemaker 1971). Research on innovation has been carried out at a number of different levels of analysis such as individual, group, organisational and societal (Schroeder et al. 1986; Slappendel 1996). With our interest in early childhood education and care organisations, we focus on the organisational level. Slappendel (1996) conducted an extensive review of the existing literature on innovation in organisations and developed a framework to classify the body of literature based on the assumptions of *who* and *what* causes innovation within an organisation. The framework affords three perspectives:

- The *individualist* perspective explains innovation determinants in terms of the actions and personality traits of the organisational participants. The perspective views individuals as self-directed agents who are rational

beings, unconstrained by external factors, and make decisions which are guided by the goals that they set. Individual characteristics such as age, gender, educational level, and personality are of interest, in addition to concepts such as change agents, leaders and innovation champions.

- The *structuralist* perspective assumes that organisational characteristics such as size, task structure, and centralisation of power are influential in determining innovation. It presumes that organisations have goals, the most basic of which includes survival. This perspective highlights the relationship between the organisation and its environment, which is actualised by including stakeholders, competitors and government policy as structural elements that influence the innovation.

- The *interactive process* perspective views innovation as a dynamic, continuous phenomenon of change, produced by the continuous interaction of the actions of individuals and the structural influences over time. This view of innovation is in contrast to the previous two perspectives that view innovation as *either* being caused by individual actions, *or* by objective structures (Slappendel 1996). As Kautz and Nielsen (2004) and Saren (1987 cited in Slappendel 1996) note, the actions of innovative individuals cannot be divorced from the activities of other individuals nor from the organisational structures within which they operate. Unlike the previous two perspectives that perceive the innovation to be static and objectively defined, the interactive process perspective views the innovation as being subjectively perceived and subject to reinvention and reconfiguration.

This tri-perspective framework has been extended and tested in other information system (IS) related organisational change studies by Kautz and Nielsen (2004), Madsen et al. (2006) and Alaranta and Kautz (2012) and allows the identification and examination of both individual/human and structural/organisational elements influencing the innovation process. In particular, through the third perspective, the framework additionally affords the ability to understand how these elements interact with each other over time to influence the innovation process.

We draw on these three perspectives but further develop and refine their elements by combining and integrating existing contributions in the fields of innovation and IT appropriation. Due to the paucity of literature on IT in early childhood education and care organisations (Plumb et al. 2013) we look to the literature examining innovation (IT-based and non-IT-based) in other educational sectors (namely schools and universities) for elements of our framework, and also from the general body of organisational innovation literature, particularly those studies which included reviews of the literature (such as Crossan and Apaydin 2010; Frambach and Schillewaert 2002; Slappendel 1996; Wolfe 1994).

Although Baldridge and Burnham (1975) suggest that individual characteristics are poor predicators of adoption of innovations, our study of the appropriation process looks not just at adoption but the adaptation and integration of IT, therefore we still consider it useful to examine a number of individual-level antecedents. The attitudinal state of an organisation's members is considered influential in organisational innovation (Pierce and Delbecq 1977), with studies on educational technology implementation demonstrating the dependency on the attitudes of educators (Bullock 2004, Kersaint et al. 2003, Woodrow 1992 cited in Albirini 2006). The existence of champions and their role in facilitating successful technological innovation is well-recognised in the innovation literature (Howell and Higgins 1990). A champion is defined as a person who makes "a decisive contribution to the innovation by actively and enthusiastically promoting its progress through the critical [organisational] stages" (Achilladelis, Jervis, and Robertson 1971 p.14 cited in Howell and Higgins 1990 p.317). In previous innovation studies within schools (Daft 1978; Grunberg and Summers 1992; Sharma 2001), leadership was considered influential in the success of innovation. In their examination of iPad adoption and use in the tertiary educational sector, Murphy (2011) found previous technology exposure promoted uptake of the innovative IT devices.

Organisational size and complexity have been found to be significant in previous innovation studies in educational institutions (Baldridge and Burnham 1975; Corwin 1975; Daft 1978). The level of centralisation of decision making in an organisation and the formalisation, or the extent of the use of rules and formal procedures, has also been found to influence innovation (Hameed et al. 2012). Within the environment of an educational organisation, parents of children/students are considered influential stakeholders and play a role in influencing the organisation's innovativeness (Bidwell 1965 and Sieber 1968 cited in Baldridge and Burnham 1975; Burden et al. 2012 cited in Clark and Luckin 2013). As Larner and Phillips (1994 p.47) posit, "the traditional image of parents as relatively passive partners in programmes that care for children has been joined by a new image of parents as consumers seeking to maximise their purchasing power in the childcare marketplace". Other environmental elements include government compliance and regulation requirements (Clark and Luckin 2013) and existing infrastructure (Clark and Luckin 2013). Competing organisations (Crocombe et al. 1991 cited in Slappendel 1996) have been noted in the innovation literature and may be

influential in our study as the early childhood sector is comprised of organisations competing for the business of providing child education and care services to parents.

The interactive process perspective is of particular interest as it permits the study of the organisational innovation process: the temporal sequence of events that occur as people interact with others and the structural elements of the organisation to appropriate the innovation within the organisational context. Events are instances when changes occur in the innovation ideas, people, transactions, contexts, or outcomes while an innovation develops over time (Van de Ven et al. 1989). Although the environment as a context is under examination as part of the structural perspective, Walsham (1993) notes that it is important to see organisational change as "linked to both intraorganisational and broader contexts, and not to try to understand projects as episodes divorced from the historical, organisational or economic circumstances from which they emerge" (p.53). We therefore look to studies of innovation as a process to enrich our interactive process perspective, and draw on Pettigrew's 'triangle' of context, content, and process (1987) from his work on studying strategic change, and on Schroeder et al.'s observations from the Minnesota Innovation Research Program (1986). We combine concepts from these studies into the following three elements of our interactive process perspective:

- The *content* of an innovation (the 'what') be it a product or a process, is perceived subjectively and is subject to ongoing reinvention and reconfiguration.

- The *context* of an innovation (the 'why') is subdivided into inner context: the structure, corporate culture, and political context within the organisation; and outer context: the social, economic, political, and competitive environment. Within the context, shocks to which the organisation is exposed can be traced as the origin of an innovation.

- The *process* of innovation (the 'how') refers to the actions, reactions and interactions from the various interested parties as they seek to move the organisation from its present to its future state.

These three perspectives summarised in table 1 form a comprehensive and coherent analytical framework that we will utilise to organise, describe and analyse our data.

Table 1. Our tri-perspective analytical framework

Perspective	Concept	Source
Individualist	Attitude towards IT	Bullock 2004, Kersaint et al. 2003, Woodrow 1992 cited in Albirini 2006 p375; Pierce and Delbecq 1977
	IT champions	Howell and Higgins 1990
	Leaders	Daft 1978; Grunberg and Summers 1992; Sharma 2001
	Previous IT exposure	Murphy 2011
Structuralist	Size	Baldridge and Burnham 1975; Daft 1978
	Complexity	Baldridge and Burnham 1975; Daft 1978
	Centralisation	Hameed et al. 2012
	Formalisation	Hameed et al. 2012
	Environment – parents as clients/stakeholders	Bidwell 1965 and Sieber 1968 cited in Baldridge and Burnham 1975; Burden et al. 2012 cited in Clark and Luckin 2013
	Environment – government compliance and regulation requirements	Clark and Luckin 2013
	Environment – existing infrastructure	Clark and Luckin 2013
	Environment – competitors	Crocombe et al. 1991 cited in Slappendel 1996
Interactive process	Shocks	Schroeder et al. 1986
	Context (outer and inner)	Pettigrew 1987; Schroeder et al. 1986
	Content	Pettigrew 1987; Schroeder et al. 1986
	Process	Pettigrew 1987; Schroeder et al. 1986

CASE SETTING

This research involves an exploratory, interpretive case study within Big Fat Smile (BFS), an early childhood education and care organisation in metropolitan New South Wales, Australia. BFS is responsible for 24 early

childhood centres within the region, providing education and care services for children from birth to five years old.

The innovation under study is a software 'app' called Kinderloop that runs on tablets and mobile devices, in particular on Apple iPad tablets, but is also accessible on PCs via a web portal. It is promoted as a safe, secure and private way for early childhood educators to communicate with parents and families of children attending an early childhood education and care centre, while also providing the functionality of documenting information on child activity and development. This combination of technologies will be herein referred to as *iPadKinderloop*. The Kinderloop app began development in 2012 in response to the founder's concern about not having appropriate times and opportunities to communicate with the educators at his children's early childhood centre in regards to being informed about his child's activity through the day.

iPadKinderloop aims to enhance early childhood education and care centre-parent communications through the following process: 1. An early childhood education and care centre installs the app onto their tablets or mobile devices, which are then made available to the educators during the day; 2. At appropriate times, the educator opens the app on the device, takes a photo and writes a short description about what is occurring; the educator can link to learning outcomes, practices and principles, centre philosophy, national quality standards, policies and procedures, educational visions etc.; 3. The child/ren are 'tagged' in the photo; 4. The photo and annotation are then uploaded to the centre's private Kinderloop instance; 5. Kinderloop automatically and securely posts update notifications to the tagged child/ren's parents; 6. Parents can then login to the centre's private Kinderloop instance using their own device with the app installed, or navigate to the online web portal using any Internet-accessible computer and see all of their child's updates and can 'like' or comment on the posts that are visible to them.

RESEARCH APPROACH

This research aims at obtaining a deeper understanding of organisational innovation through the process of appropriating IT into an early childhood education and care organisation. We also aim to assess the applicability of the presented analytical framework, in particular the suitability of the interactive process perspective as a lens into the IT appropriation process, and as such we have used the framework as background for our data collection, the coding of the data and the data analysis.

Data collection occurred at four BFS centres that were appropriating iPadKinderloop between November 2013 and January 2014. Not all centres were at the same 'stage' or level of appropriation due to differences in the timing of the roll-out; although the BFS Head Office mandated the use of iPadKinderloop, it was left to centre directors to decide when they would start using it. The empirical data was collected via semi-structured interviews with two or three educators at each centre, each centre director, and the Chief Executive Officer (CEO) of the BFS organisation, resulting in a total of 13 interviews. The data was complimented by a collection of 12 short videos provided by the Kinderloop software founder which were comprised of short testimonials from current Kinderloop users, including educators, centre directors and parents/family members. These videos are publicly available on the Vimeo website (http://vimeo.com/kinderloop). Data was also obtained via observations of current practices and the examination of secondary documents used by early childhood centres in Australia including the Early Years Learning Framework and National Quality Framework.

The transcriptions of the 13 interviews were coded and analysed utilising the concepts from the analytical framework. First, the interviews were coded according to the overarching perspectives (i.e. individualist, structuralist, interactive process perspective). Second, we coded the data in relation to the components of each perspective of the framework. The 12 short videos were first viewed by the first author who made notes on the vision, and these notes were subsequently coded and analysed in a similar manner to the interview transcripts. In the following we use pseudonyms for our interview participants when quoting original data.

FINDINGS

Practices Prior to iPadKinderloop

Before we examine the innovation process of appropriating iPadKinderloop and the resultant changes, it is useful to understand the practices of communicating with families, documentation processes and usage pattern of iPads within the BFS centres prior to iPadKinderloop.

Prior Methods of Communicating: Centre director Rochelle outlines how centres communicated with families of children attending their centre prior to the introduction of iPadKinderloop: "In the old days, we used to put stuff in parent pockets, and parents would never check pockets. We put notes up on the door, parents wouldn't read them, and we were really frustrated that the communication wasn't getting through".

Prior Methods of Documenting Children's Learning and Development: Documentation of children's development is a critical aspect of the role of an early childhood educator, and the use of paper-based documentation occurs extensively within the early childhood sector (Piper et al. 2013). Within the 'curriculum' for Australian early childhood education and care providers the process of documentation is noted as part of the assessment for learning and intentional teaching aspects of the role of an early childhood educator (AGDEEWR 2009). There were two key documents produced within the centres: the day book, also known as a diary or reflection book, and child portfolios. The day book was observed as a physical book which was placed at the entry to the centre and provided parents with the opportunity to see an overview of what their child and their peers had experienced during the day. It was comprised of printed photos and annotations (either hand-written or typed) which illustrated and described activities that the children had participated in during the day. Child portfolios were comprehensive hard-copy documents provided to parents at the end of the year which included photos, annotations and examples of their children's art or other artefacts which demonstrate the developmental and learning progress of the child. Portfolios were historically costly, hand-written documents with commercially-developed photos glued on the paper where required, but with more centres providing PCs for educators, the presentation of the portfolios changed to word-processed printed documents which included printouts of photos taken with digital cameras.

Prior Usage of iPads: Centres had begun to appropriate iPads before the arrival and establishment of iPadKinderloop. They were used both by individual children and in groups to play games, watch videos, and to look up items of interest by the children on the Internet. Educators also spoke of the usefulness of the iPad as a tool to help settle children who were experiencing separation anxiety when their parent dropped them off at the centre, and as a particularly useful tool for children with special needs.

The Individualist Perspective

Attitude towards IT and iPadKinderloop: The majority of educators and centre directors spoke positively about iPadKinderloop and IT, describing it as "exciting" (Cindy), "amazing" (Rochelle) and "something I am interested in" (Sharon). As Rochelle noted, "everyone here was pretty keen to do it, everyone was pretty motivated". Chris spoke of how using iPadKinderloop helps his teaching practices, particularly in saving time: "It means less time off the floor mucking around with paper and typing it on computers, because I can do it all on the go and then because of that it means I get to spend more time with the children, and ideally that's what I want, and that's what the families want as well". The enthusiasm was however not across the board, with one educator in particular speaking of being overwhelmed and lacking confidence in using IT, calling it "a very big learning curve", but acknowledging that she was building confidence.

IT champions: Rochelle and Judy, both centre directors, exhibited traits of being IT champions; Rochelle explained how 4 years ago, she and Judy had the idea of starting a blog for her centre, in order to get families "more involved in what they were actually doing at the service", and because traditional forms of communication with the parents as those mentioned above were not entirely successful. When describing how centres were chosen to be pilots for the Kinderloop app, Judy recounted suggesting Rochelle and her centre as a pilot site, describing Rochelle as "very innovative" and being "totally open to it". Judy described how she and Rochelle had been looking for innovative ways to communicate with families "for years and years…and then we found Kinderloop!". Rochelle and Judy are also considered 'Superloopers' by the Kinderloop founder, promoted as 'key ambassadors' for the app. As part of this role they were responsible for visiting other BFS centres and providing advice to directors on how to begin appropriating iPadKinderloop.

Leaders: The direct influence of the CEO as a leader on the appropriation was evident. After he had been introduced to the Kinderloop founder at a conference in March 2012, he recounted how in his next meeting with the Kinderloop founder "in an hour he sold me Kinderloop hook, line and sinker" and that he "made the decision that we would roll out Kinderloop to all of our centres because we saw great value in it". He viewed Kinderloop as "new and innovative" and he wanted it to be a part of the value-add experience that his organisation provides in their early childhood services. The CEO was not only directly influential in the iPadKinderloop appropriation, but also indirectly; he was described by Judy as "passionate about the industry". She described him as really supportive of innovative activities, and that he was "passionate about it [Kinderloop] and driving it, because he's all about families and communities".

Previous IT exposure: As noted earlier, the four BFS centres examined had previously appropriated iPads, and were already familiar with the device which forms the platform for iPadKinderloop. Many educators spoke of their IT use in their personal lives, with PCs, iPads and smart phones in common use.

The Structuralist Perspective

Size, complexity, centralisation, and formalisation: BFS is governed by a Board of Directors, responsible for determining policy, strategic direction and operation of the organisation. It has over 500 staff, with 268 employed within the 25 early childhood centres. BFS has a flat organisational structure with very few hierarchy levels: each centre has a director, and reports to a group of Area Managers, who have managerial responsibilities including staffing and budgetary performance, and developmental responsibilities such as staff and centre development and the development of effective family and community relationships. The Area Mangers report to the General Manager, People and Operations, who in turn reports to the CEO. BFS utilises a combination of centralised and decentralised decision-making when it comes to IT. The decision to appropriate iPadKinderloop was made by the CEO, and after approval by the Board and a meeting with centre directors, all centres began the appropriation of iPadKinderloop in August 2012. The appropriation was made mandatory, but the CEO explained: "I didn't compel a hard and fast deadline. The primary motivator for local action was periodic contact from the Area Managers and head of marketing on progress, as in my experience the best motivator for action is the compulsion to report back". It was up to centre directors to decide how and when they would begin appropriating iPadKinderloop. Centres have a degree of autonomy in deciding to purchase IT, although as the CEO explained it is a "standard inclusion" for any new BFS centres. The CEO also stated that the centres acquired their IT in different ways: "Some centres purchased them with the assistance of their parents and citizens groups; others put them on their capital request bids, and Big Fat Smile HQ has arranged it for them. And the third source is the Early Start Initiative[1] at the university". No firmly rooted procedures had to be followed in regards to the appropriation, nor was there a specific implementation plan.

Environment – parents as clients/stakeholders: Participants spoke of the importance of communication between centres and parents, as the CEO stated that "when people are paying for the services we provide you find ways in which the connections can be stronger...there's an onus on us, as a provider, to ensure that the parents have as much information as possible, so they can feel good about their purchase decision!". The ability of iPadKinderloop to provide a way to communicate directly with parents was considered "really important" and the CEO described its role as a communications tool which "helps us overcome the pressures and tensions of those short contact points [between parents and educators] each day". When speaking about the trial of iPadKinderloop at her centre, Rochelle commented: "We started off with just a small focus group of families, so probably about 20 families, and we chose families that were tech savvy, that probably wouldn't mind if we made mistakes as well…and then we started adding more and more people on. And now all the families are on, and yeah they love it". The support of parents and citizens groups at centres was also influential in obtaining the iPads prior to the establishment of iPadKinderloop, as centre director Sharon recounted: "They [the parent committee] had a substantial amount of money sitting in their kitty. So we just said to them that we would like to purchase them [iPads] to use with the kids to broaden their capacity with technology. So we talked about that and they were really easy going. They were like 'Oh, yeah, if you think that's a really important thing then we'll get them'".

Environment – government compliance and regulation requirements: The National Quality Framework (NQF) was established in 2012 and applies to most preschool/kindergarten and outside schools hours care services in Australia (ACECQA 2014), including the BFS centres. The National Quality Standard (NQS), a key aspect of the NQF, sets a national benchmark against which every early childhood education and care centre in Australia is assessed. When a centre is assessed against the NQS, they receive a rating for seven areas (educational program and practice; children's health and safety; physical environment; staffing arrangements; relationships with children; collaborative partnerships with families and communities; and leadership and service management) and an overall rating, which is then published for public viewing on the Australian Government's 'MyChild' website (ACECQA 2014b). The NQS is also linked to the national Early Years Learning Framework (EYLF) which describes the principles, practices and outcomes that support and enhance young children's learning from birth to five years, as well as their transition to school (AGDEEWR 2009). The CEO confirmed that these government compliance and regulation requirements were a significant consideration in the iPadKinderloop appropriation.

Environment – existing infrastructure: The four BFS centres had previously appropriated iPads. Therefore the establishment of iPadKinderloop simply required the installation of the Kinderloop app onto the devices. As Rochelle recalls, "we had the iPads, we were pretty much ready to go, we just needed Wi-Fi installed and we had to download one app". Rochelle's quote highlights the other infrastructure required for iPadKinderloop: a

---

[1] Early Start is a project, aiming to drive social change through teaching programs that utilise 21st century technologies (http://earlystart.uow.edu.au/index.html).

Wi-Fi connection to use the iPads as mobile devices with the app requiring access to the Internet. Some centres had Wi-Fi in place; others had to have it installed.

Environment – competitors: The early childhood education and care is a competitive industry, as Judy states: "We've got 17 services that I'm in direct competition in and...just two, that are community-based not for profit. And I've had a little bit of a look around at some of them, and they are run by people that just want to make money". BFS is a not-for-profit organisation who according to the CEO focuses on a "very deliberate differentiation on the high quality side of things...all of those little value-adds, whether they're cultural, sporting, convenience, however they might be perceived, are tied up in what we're presenting as our brand value proposition…[and] Kinderloop is yet one-more value-added".

The Interactive Process Perspective

The motivation behind the development of the Kinderloop app is an inherently social one: as a parent, the founder felt that communication between parents and educators at the centre his child attended needed improving; parents are always rushed when picking up their children and they do not have time to stop and talk to the educators about how their child was through the day; and they may feel guilty or anxious about leaving the child at a centre while going to work, wondering if they are okay. The BFS CEO was first exposed to Kinderloop at a conference, at which the Kinderloop founder had been invited by one BFS Board of Directors member, who is a head teacher of child studies and had become aware of Kinderloop through her work. The CEO "saw great value" in Kinderloop and evaluated it against its expected affordances and against the existing practices and norms of the BFS early childhood centres.

From a social perspective, the CEO viewed the affordances of Kinderloop within the context of a number of social and cultural contextual concepts, including parental guilt and anxiety over leaving children at centres and not knowing what they were doing through the day; time-poor parents; and the "need to provide as much information as possible to parents" and the "importance of strengthening family-centre communications". The decision by the CEO to introduce Kinderloop to the organisation was also shaped by the fact that BFS exists within in a competitive market of early childhood service providers and is striving to differentiate themselves by providing high quality early childhood services with added values, of which he considered Kinderloop to be one such added value. A decision was made to trial iPadKinderloop in two centres managed by directors with technology champion traits and who had previously considered different ways to better communicate with families by digital means. One of these directors recounted how she was initially cautious about iPadKinderloop, but this changed once she had begun to appropriate it as it helped her to establish relationships with children and families.

Once the pilot at the two centres had been deemed successful, the decision was made at BFS Head Office to make Kinderloop mandatory across all centres, however no timeframe was given, only that centre directors needed to report their progress to their Area Manager every two months; the CEO viewed this reporting as a "stronger incentive for centres to roll out iPadKinderloop than enforcing a deadline". As there were no formalised procedures, centre directors worked collaboratively with their staff to develop guidelines for its use. Centre director Rochelle described how these resultant guidelines were practical in nature and intended to be used to guide how educators utilised iPadKinderloop, such as a "three sentence maximum for the individual posts", "no personal posts", and "processes in place so that we're checking each other's posts" to ensure a certain level of quality. Educator Chris described an informally negotiated norm between himself and the other educator who teaches in his room, where they mutually negotiated to make "about 30 posts a day, we try our best to cover each child at least once".

We found evidence that the content of the innovation of iPadKinderloop differed in a number of centres. At two centres in particular it was evident that the way it was used was directly influenced by the understandings that the directors had of its affordances and their evaluation of it as a tool amongst the existing practices. At one centre, a director had evaluated the affordances and determined its suitability as a communication tool, but with a distinct focus on documenting learning that is happening, which is then useful for educators to 'cut-and-paste' when programming[2] to save time: "We use it mainly as a communication tool, but we also try to show the learning that's actually happening as well…when we're programming, take bits and pieces off Kinderloop as well that we've seen, like little observations and we use it as part of the children's individual plans". In contrast, another director had developed strong views on not using it as a developmental documentation tool but more as a simple event-recording tool: "We're not using it as a massive developmental tool for analysis of the learning that's occurring, because I don't think I'd like it to be used that way...I think it's far more beneficial as a

---

[2] Programming here refers to the educators' activity of documenting an experience and activity sequence before and after observing the children within the early childhood centre.

communication tool for families". Centre directors and educators spoke of how iPadKinderloop had transformed the practices of documenting children's learning and development, where the day book and portfolios were discontinued and replaced by iPadKinderloop. As educator Chris recounted: "In terms of programming, we don't have to do daily reflections anymore, which is good because Kinderloop puts out all the pictures we do, it lets people know what we're doing throughout the day". There was also evidence that the practice of communicating information to parents had changed substantially, not only in how the information was transmitted but also in the response from parents, indicating increased engagement, as Rochelle recounts: "We've put a lot of things [on Kinderloop], like last year we did like a pet interest, and normally even if I were to email, we might get one or two photos of kids' pets…last year we put photos on a pet board, we talked about the pets, people brought pets in, and we had so much more engagement from families".

Parents as key stakeholders also influenced the appropriation process. Initially during the pilot, a small group of families were specifically chosen to be a part of the activities. Then after the pilot had been completed, other families became involved. All educators and centre directors spoke of positive feedback from families; as Rochelle stated, "they love it". In addition to this positive feedback, educator Anita recalls how parental feedback on the posts that educators were making to Kinderloop informed changes to the content of the photo annotations: "It used to be a formal observation of what the child was doing and how it links to the EYLF; we still do link the outcomes to the photos, but we'll just put 'LO 4.1' so that it means nothing to the parents, they can still see that but it's just for our use. So what we used to do is we would write something like 'Bella is using her right hand to draw a picture and from this we can see we she's got good fine motor skills', using that technical language whereas now we'd write 'Bella is having a great time drawing a picture for mum', it's really casual and more informal". This comment also illustrates how the government regulatory requirements influenced the way the educators were utilising iPadKinderloop. From the perspective of the centres, iPadKinderloop has transformed the way they communicate with families, providing a deeper level of engagement with them. From the perspective of parents, their appropriation of the app on their devices, presented a series of processes that are notably social in nature, for example allowing them to be reassured that their child is doing well or promoting engagement with their children ("[Kinderloop is] a really great conversation starter in the evening, because most young children can't remember what they did" (Megan)).

Kinderloop as part of the innovation content of iPadKinderloop was noted as evolving and continued to evolve throughout the appropriation process; Rochelle recounted the very first time they met with the Kinderloop founder: "It wasn't even a proper app when they were showing us, it was just like a PDF kind of thing to actually show us how it all worked". Then when the app was first piloted, the directors of the pilot centres worked with the Kinderloop founder to adjust software features to suit them, as Rochelle describes: "It's been a really interesting process for us to go through because it was a very basic app to begin with, like there was no tagging, you could only put one photo in, and then, working with the [Kinderloop] guys they were like 'oh so you want to put more than one photo in?' and [we said] 'well yeah…we want to show the progression of what a child's doing', so then they added more photos…so there were steps that we went through with them, to help develop it". Rochelle also mentions that they continue to work closely with the Kinderloop founder to suggest more features to be added to the software, such as exporting details and including video footage in posts.

DISCUSSION

According to the individualist perspective, individuals have traits or characteristics which predispose them to innovative behaviour, and innovation is caused by individual actions. The presence of two centre directors with personal characteristics such as a positive attitude towards IT in early childhood and the personal initiative to consider digital forms of communication with parents such as blogs long before the arrival of iPadKinderloop positively influenced the successful iPadKinderloop appropriation, through their support of the pilot and also their role as key ambassadors for iPadKinderloop. This supports the studies on innovation that have established that innovative activity is promoted by technological champions (Howell and Higgins 1990). The CEO's role in the initiation of the appropriation process within the BFS organisation cannot be underestimated; his initial exposure to the app via the founder at the industry conference which had been instigated by a Board member, and his subsequent acceptance and drive for the appropriation has clearly influenced the appropriation process. Through the CEO's passion for delivering 'value-add' to the services his organisation provides, and his enthusiasm for the families and their involvement in his centres (as testified by his staff), the benefits that iPadKinderloop affords have been realised. We concur with Daft (1978) who notes that "leaders are active in the innovation process" (p.193). However as Saren (1987 cited in Slappendel 1996) argues, the actions of innovative individuals cannot be divorced from either the activities of other individuals or from the organisation structure within which they operate. Therefore although applying the individualist perspective provides useful insights, it is limited in only providing partial explanations.

The structuralist perspective contributes to our understanding of the cases by examining organisational characteristics and elements from the organisation's environment. The relatively flat hierarchy of the BFS organisation seems to have contributed to the smooth iPadKinderloop appropriation, despite the absence of a formalisation implementation plan for the roll-out. This finding is in contrast to other studies on innovations in educational institutions who found that a "large, complex organization with a heterogeneous environment is more likely to adopt innovations than a small, simple organization with a relatively stable, homogeneous environment" (Baldridge and Burnham 1975 p.175). The fact that a strict deadline was not imposed on centres for the appropriation, coupled with the lack of guidelines meant that although the appropriation was mandated in a 'top-down' fashion, centres had some degree of autonomy in deciding when and how the appropriation would unfold. The environmental elements of parents as stakeholders, government compliance and requirements, existing infrastructure and competitors were certainly influential in the appropriation process. As Leaner and Phillips (1994 p.43) state, "few would disagree that parents are a key childcare stakeholder group" and the desire of the organisation as recounted by the CEO and directors and educators to strengthen parent-centre communications was a significant driver in the iPadKinderloop appropriation. Along with iPadKinderloop's ability to transform the practices of centre communication with parents, the recent government compliance and regulation requirements of the NQF, NQS and EYLF were influential in how iPadKinderloop was appropriated, as its features allowed educators to replace traditional forms of documenting children's learning and development and facilitated, in the words of the CEO, "our educators in our centres to far more readily, and cost-effectively, deliver on their obligations, the documentation and reporting". However, as with the individualist perspective, the structuralist perspective only provides partial explanations, and so we look to interactive process perspective to take into account the relationship between the individualist and structuralist elements, and by focusing on the complex interplay between these various factors, allows for a more detailed analysis.

The interactive process perspective permits us to understand how the interplay of the individual and structural elements influenced the innovation process over time. The appropriation of iPadKinderloop can be traced to the 'shock' of the Kinderloop founder being introduced to the BFS CEO at the industry conference. As Schroeder et al. (1986) state, a shock does not need to be viewed as a negative, but rather as something that stimulates efforts by people to begin work on an innovation, which is what happened in our case study, as the CEO took an interest in Kinderloop and began to evaluate its potential within the context of his early childhood organisation. The outer context concepts of the social and competitive environment were particularly influential at all stages of the process; at the beginning, the evaluated affordances of Kinderloop to strengthen communications between centres and parents and to deliver value-add to the services provided by the BFS organisation were evident. The social context of the importance of communicating with parents, and the nature of parents as stakeholders was particularly evident throughout the appropriation process, from the start when parents were involved in the pilot, through to iPadKinderloop in fluent use and the positive feedback provided to educators by parents. The content of the innovation was shown to evolve in different ways in different centres, which was a result of the individual perspectives of the centre directors in regards to their evaluated affordances of the technology, combined with the structural influence that although iPadKinderloop had been mandated by the CEO, centre directors had a degree of autonomy into the decision-making that shaped how iPadKinderloop was appropriated in their own particular centres. The content of iPadKinderloop continued to change throughout the appropriation process, through influences such as parent feedback e.g. resulting in changes to the annotations of posts, and educator feedback to the developers e.g. tagging in posts and uploading of videos. The work practices of educators, in particular communication with parents, and documentation of children's learning and development, were transformed by iPadKinderloop appropriation. Although other studies of innovation have found that as an innovation develops, the 'old' and the 'new' ways of doing things exist concurrently and over time are linked together (Schroeder et al. 1986), we observed that this was not always the case with our study; for example the 'old' way of communicating the day's activities through the production of a day book, and the 'old' way of documenting a child's learning and development in a portfolio were both discontinued and replaced by the artefacts produced by iPadKinderloop.

CONCLUSION

This study addresses shortcomings in the limited body literature on innovation and IT appropriation in early childhood education and care organisations. We contribute to the IS literature a detailed, tri-perspective account of organisational innovation and the process of IT appropriation, and demonstrate that neither an individualist nor a structuralist perspective alone provides a deep understanding of the process. We confirm that "organisation change and its implementation is viewed as a complex, messy process inseparable from its intra-organisational and broader contexts" (Walsham 1993 p.53) and we have demonstrated that the process of IT appropriation occurs through a complex interaction between individual action and structural influences and thus is better understood through a tri-perspective framework. As we have provided a rich case study of a IT

appropriation, we contribute to IS practice by exposing the multi-faceted influences on IT appropriation which provides a basis for managers to plan and prepare for IT appropriation. However further research is required to derive more detailed information to guide managers in facilitating the appropriation of IT.

We also acknowledge that there are implications to the appropriation of such technology including workplace privacy, employee performance monitoring, the inadvertent recording of child misbehaviour and/or injury, and digital inclusion issues, which have not been addressed in this study. Additionally, parental perceptions and attitudes towards the appropriation of the iPadKinderloop were limited to the data collected from the videos provided by the Kinderloop founder. The first author is currently conducting further research and interviews with participants (centre directors, educators and parents) in order to discuss such issues and consequences.

REFERENCES

Al-Qirim, N. 2011. "Determinants of interactive white board success in teaching in higher education institutions", *Computers & Education* (56:3), pp. 827-838.

Al-Qirim, N. 2012. "Adoption vs. usage of interactive white board technology by teachers in higher education institutions", *ACIS 2012*, Geelong, Victoria, Australia.

Alaranta, M., and Kautz, K. 2012. "A Framework for Understanding Post-Merger Information Systems Integration", *Journal of Information Technology Theory and Application* (13:1), pp. 5-30.

Albirini, A. 2006. "Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers", *Computers & Education* (47:4), pp. 373-398.

Australian Children's Education and Care Quality Authority. 2014a. "Introducing the National Quality Framework"   Retrieved 27 January, 2014, from http://www.acecqa.gov.au/national-quality-framework/introducing-the-national-quality-framework

Australian Children's Education and Care Quality Authority. 2014b. "The National Quality Standard" Retrieved 27 January, 2014, from http://www.acecqa.gov.au/national-quality-framework/the-national-quality-standard

Australian Government Department of Education Employment and Workplace Relations. 2009. "Belonging, Being and Becoming: The Early Years Learning Framework for Australia".

Baldridge, J.V., and Burnham, R.A. 1975. "Organizational innovation: Individual, organizational, and environmental impacts", *Administrative Science Quarterly* (20:3), pp. 165-176.

Barron, B., Cayton-Hodges, G., Bofferding, L., Copple, C., Darling-Hammond, L., Levine, M. 2011. "Take a Giant Step: A Blueprint for Teaching Children in a Digital Age". The Joan Ganz Cooney Centre at Sesame Workshop, New York.

Bolstad, R. 2004. "The role and potential of ICT in early childhood education - A review of New Zealand and international literature".

Bourbour, M., Vigmo, S., and Pramling Samuelsson, I. 2014. "Integration of interactive whiteboard in Swedish preschool practices", *Early Child Development and Care*, pp. 1-21.

Clark, W., and Luckin, R. 2013. "What the research says: iPads in the Classroom". London Knowledge Lab, Institute of Education, University of London.

Cooper, R.B., and Zmud, R.W. 1990. "Information Technology Implementation Research: A Technological Diffusion Approach", *Management Science* (36:2), pp. 123-139.

Corwin, R.G. 1975. "Innovation in organizations: The case of schools", *Sociology of Education* (48:1), pp. 1-37.

Crichton, S., Pegler, K., and White, D. 2011. "Personal Devices in Public Settings: Lessons Learned From an iPod Touch / iPad Project", in: *6th International Conference on e-Learning*. Okanagan Kelowna, British Columbia, Canada.

Crossan, M.M., and Apaydin, M. 2010. "A multi‑dimensional framework of organizational innovation: A systematic review of the literature", *Journal of Management Studies* (47:6), pp. 1154-1191.

Daft, R.L. 1978. "A dual-core model of organizational innovation", *Academy of Management Journal* (21:2), pp. 193-210.

Frambach, R.T., and Schillewaert, N. 2002. "Organizational innovation adoption: a multi-level framework of determinants and opportunities for future research", *Journal of Business Research* (55:2), pp. 163-176.

Grunberg, J., and Summers, M. 1992. "Computer innovation in schools: a review of selected research literature", *Journal of Information Technology for Teacher Education* (1:2), pp. 255-276.

Hameed, M.A., Counsell, S., and Swift, S. 2012. "A conceptual model for the process of IT innovation adoption in organizations", *Journal of Engineering and Technology Management* (29:3), pp. 358-390.

Howell, J.M., and Higgins, C.A. 1990. "Champions of technological innovation", *Administrative Science Quarterly*, pp. 317-341.

Kautz, K., and Nielsen, P.A. 2004. "Understanding the implementation of software process improvement innovations in software organizations", *Information Systems Journal* (14:1), pp. 3-22.

Larner, M., and Phillips, D. 1994. "Defining and Valuing Quality As a Parent", in *Valuing quality in early childhood services: New approaches to defining quality,* P. Moss and A. Pence (eds.). Thousand Oaks, CA: SAGE Publications Inc.

Madsen, S., Kautz, K., and Vidgen, R. 2006. "A framework for understanding how a unique and local IS development method emerges in practice", *European Journal of Information Systems* (15:2), pp. 225-238.

Mendoza, A., Carroll, J., and Stern, L. 2010. "Software Appropriation over Time: From Adoption to Stabilization and Beyond", *Australasian Journal of Information Systems* (16:2), pp. 5-23.

Murphy, G.D. 2011. "Post-PC devices: A summary of early iPad technology adoption in tertiary environments", *e-Journal of Business Education & Scholarship of Teaching* (5:1), pp. 18-32.

Pettigrew, A.M. 1987. "Context and action in the transformation of the firm", *Journal of management studies* (24:6), pp. 649-670.

Pierce, J., L., and Delbecq, A.L. 1977. "Organization Structure, Individual Attitudes and Innovation", *The Academy of Management Review* (2:1), pp. 27-37.

Piper, A.M., D'Angelo, S., and Hollan, J.D. 2013. "Going Digital: Understanding Paper and Photo Documentation Practices in Early Childhood Education", in: *16th ACM Conference on Computer-Supported Cooperative Work (CSCW)*. San Antonio, United States: pp. 1319-1328.

Plumb, M., Kautz, K., and Tootell, H. 2013. "Touch screen technology adoption and utilisation by educators in early childhood educational institutions: A review of the literature", in: *24th Australasian Conference on Information Systems (ACIS)*. Melbourne, Australia.

Rogers, E.M., and Shoemaker, F.F. 1971. *Communication of Innovations; A Cross-Cultural Approach*. New York: Free Press.

Schroeder, R., Van de Ven, A.H., Scudder, G.D., and Polley, D. 1986. "Managing innovation and change processes: findings from the Minnesota Innovation Research Program", *Agribusiness* (2:4), pp. 501-523.

Sharma, R. 2001. "Innovation in Schools: Identifying a Framework for Initiating, Sustaining and Managing Them", in: *Annual Meeting of the American Educational Research Association*. Seattle, Washington, USA.

Slappendel, C. 1996. "Perspectives on Innovation in Organizations", *Organization Studies* (17:1), pp. 107-129.

Van de Ven, A.H., Angle, H.L., and Poole, M.S. 1989. *Research on the management of innovation: The Minnesota studies*. New York: Ballinger/Harper & Row.

Walsham, G. 1993. *Interpreting Information Systems in Organizations*. Chichester, UK: John Wiley & Sons Ltd.

Wolfe, R.A. 1994. "Organizational innovation: Review, critique and suggested research directions", *Journal of Management Studies* (31:3), pp. 405-431.

Zhao, Y., Pugh, K., Sheldon, S., and Byers, J. 2002. "Conditions for classroom technology innovations", *The Teachers College Record* (104:3), pp. 482-515.

COPYRIGHT