How do school leaders navigate ICT educational reform? Policy learning narratives from a Singapore Context

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VICENTE CHUA REYES

The purpose of this research inquiry focuses on how school leaders ‘make sense’ of educational reform in their local contexts. In order to do this, an exploratory qualitative case study of two schools that took part in policy reform initiatives directed at ubiquitous use of information communication and technology (ICT) in the Singapore city–state context is undertaken. Using focus group discussions (FGDs), interviews and observations this inquiry investigates and builds emerging explanations to sense-making experiences of actors in the midst of reforms. Using Bruner’s narrative analysis, findings from this inquiry provide a picture of how school leaders cope in periods of uncertainty. School leaders in the midst of leading-edge reforms in ICT experience shifting identities, emerging roles and ambivalent capacities. This inquiry proposes a policy learning approach for educational leaders facing uncertain futures.

This qualitative research inquiry explores how school leaders situated within the island city–state of Singapore cope with the incessant and seemingly endless transformations that occur in schools. This article asks one general question: How do Singapore school leaders make sense of the introduction of ubiquitous information communication technology (ICT) usage in schools? The central phenomenon to be studied focuses on how school leaders ‘make sense’ of educational reform as it occurs in their local contexts. In order to do this, an exploratory case study of two target schools taking part in ICT policy reform initiatives would be the locus of this inquiry. Using findings from focus group discussions (FGDs), interviews and observations, this inquiry investigates and builds emerging explanations as to how school leaders ‘navigate through and make sense’ (Reyes, 2010, p. 397) of the introduction of ICT reforms.

This exploratory inquiry is divided into four sections. The first section provides the theoretical lens from which the main question would be pursued. This introductory part also includes a description of the Singapore context with an emphasis on how ICT has become a pervasive policy initiative in Singapore. The second section elaborates on the methodological

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Approach taken for this inquiry. An explanation of the scope and limitations of this exploratory qualitative case study is also included in this section. The third attempts to explore sense-making by focusing on how school leaders perceive changes and continuities on their identity, analysing their emerging roles and emphasizing on the varying sense of capacities (and abilities) that leaders experience while undertaking reform. The fourth and final section provides a reflection on the type of policy learning that school leaders experience whilst implementing ICT-intensive reforms in a Singapore school context.

**Sense-making experiences: identities, roles and capacities**

This article assumes that schools, as loosely coupled systems (Weick, 1976), experience great complexity during reforms. Within a context that is driven by hyper reforms, the introduction of ICT forces teachers to undergo ‘fundamental disjunctures’ (Appadurai, 1990, p. 6), where skills and knowledge that they have acquired clash with new technologies. This inquiry recognizes that in a context where ICT becomes a fundamental piece of the reform agenda, it becomes an important non-human actor in the way that social relationships in schools emerge. This article contributes to ongoing debates surrounding the role that developed nations—like Singapore—play in deliberately connecting education systems with ICT (Selwyn & Brown, 2000) by focusing on the emerging issues that confront education leaders. The interactions of human and non-human actors become networks where disjunctures occur and where various actors engaged in the reform undergo sense-making experiences. Sense-making, which is an identity creation as well as a contested, reflected and shared activity among various members of the school system, would be explored primarily under the theoretical lens of narrative analysis. In exploring how actors navigate their experiences, Latour’s definition of what a network is, particularly the notion of it being ‘a set of relations defined as so many translations’ (Latour, 2005, p. 129) as contained in his actor network theory (ANT) becomes useful in the analysis. Latour’s notion of sets of relations between actors embodied in translations provides an insightful perspective that aims to explain how people, their ideas and the material objects they produce join together in a dynamic network’ (Koyama, 2011, p. 21). The narrative analysis in the tradition of Bruner would be complemented by Latour’s translation theory:

Translation theory suggests instead that attempts to order the world, including the most specialized technical and scientific papers, are not disinterested activities but are highly strategic attempts to bind humans and nonhumans together and make them accept particular definitions of their capacities, roles and identities. (Shiga, 2007, p. 45)

Identity formation emerges as one of the fundamental reactions to these experiences. School leaders who find themselves in these periods of uncertainty realize that the ‘establishment and maintenance of identity is a core preoccupation in sense-making’ (Weick, 1995, p. 20). Furthermore, this inquiry posits that as these leaders—who can also be referred to as policy
actors—navigate through various waves of education reform disjunctures, they make choices that either empower or disempower them. In a word, their sense-making experiences impact on the emerging roles that they assume. Aside from identity and emerging roles, it is also affirmed that whilst attempting to make sense, leaders also experience decisions that impinge on their perceived capacities.

This exploratory inquiry captures the sense-making experiences of the school leaders by mapping their narratives as they weave ‘through things they have added to social skills’ in order to ‘render more durable the constantly shifting interactions’ that these actors experience in the midst of reform (Latour, 2005, p. 68). Translation theory within ANT posits that causal relationships may not be the most appropriate manner of making inferences in interrogating social relationships. In other words, this inquiry about school change will not pretend to establish how ICT policy causes school leaders to behave in a particular manner which then causes the school to change in a specific way. Instead, viewing actors as mediators who ‘transform, translate, distort and modify the meaning or the elements they are supposed to carry’, which, in this particular case, would be ICT reform policies, as opposed to intermediaries who transport ‘without transformation’ (Latour, 2005, p. 39) would be more meaningful. This article definitely resonates with how Weick describes educational organizations: complex and loosely coupled. The inquiry will explore the actors’ narratives as they make sense of the Actor-Networks they become part of or what Latour describes as the various ‘traces of interactions’ that have occurred consisting of ‘human-to-human connections’ or ‘object–object connections’ and the possible links that have been established as a ‘zigzag from one to the other’ in the midst of carrying out ICT reforms (Latour, 2005, p. 75).

Singapore context

Understanding the wider context of Singapore is important in order to discover the rationale for the need to undertake school reforms. Investments in education and training are intrinsically linked to the economic developments that the nation-state has pursued. Singapore today enjoys a high GDP per capita at around US$ 52,631.53 (SGD $65,048 end of 2012) (Singapore Statistics, 2013). This robust economic performance is matched only by its sterling record in educational achievements. Singapore’s levels of educational attainment can be compared with international benchmarks and more importantly also reflect a balanced spread within the key ethnic groups within the country.¹ The 1996 Third International Math and Science Study (TIMSS) acknowledged that Singapore was one of the top-performing countries in 3rd and 4th grade Mathematics (Mullis et al., 1997) and the best-performing country in 8th and 9th grade Science (Beaton et al., 1996). In the 2003 version of TIMMS, Singapore emerged once again as one of the top-performing countries in 8th and 4th grade Science and 8th and 4th grade Mathematics (Martin et al., 2003). The Progress in International Literacy Study (PIRLS) indicated that Singapore was one of the top three performing countries in its 2006 report (Mullis & Martin, 2007).
In the 2009 Singapore Education Statistics report, the secondary school completion rates for all the ethnic races in the nation averaged 97% (Ministry of Education-Planning Division, 2009). Guided by an elite corps of technocrats and leaders (Hill & Lian, 1995; Vasil, 1984), Singapore has been able to amass significant amounts of capital both economic and human, to merit for the nation consistently top rankings as one of the world’s most prosperous and competitive nations (Garelli, 2007; World Economic Forum, 2009). The nation-state has consistently received accolades as the world’s most globalized country (A.T. Kearney & Carnegie Endowment for International Peace, 2007). Singapore has also been identified as a best performer in the 2010 Programme for International Student Assessment (PISA) (Gurria, 2010):

Out of 65 countries and economies that took part in PISA 2009, Singapore students ranked fifth in Reading, second in Mathematics and fourth in Science. Singapore also had the second highest proportion (12.3%) of students who are top performers in all three domains. (Ministry of Education, 2010)

Without a doubt, the current phenomenal economic and education progress experienced by Singapore is a far cry from the vulnerable entrepot city-state that it was some 40 years ago. However, with the dawn of the twenty-first century, Singapore faces different sets of vulnerabilities brought about by the forces of globalization and competition from such rapidly developing economies as China and India. Burbules and Torres identified the twenty-first-century education problematic as a needed paradigm shift in ‘educational aims that have more to do with flexibility and adaptability’, rather than the standardization that characterized the earlier industrial phase and greater harmony among peoples and among nations (Burbules & Torres, 2000, p. 22). The prime minister spoke about this when he identified education as an ‘effective strategy’ which will enable Singapore to survive and to thrive in a changing world (Lee, 2006).

Leadership in the midst of education reforms

Decentralization in education and an increased on-site autonomy for schools have serious policy implications and practical consequences on the part of school leaders: for purposes of this inquiry, principals, vice-principals (VPs), heads of departments (HODs) and subject heads (SHs) comprise school leaders. Peters, Marshall and Fitzsimmons underscored both a theoretical and practical paradox when they highlighted that with the state being the ‘monopoly supplier of education, while at the same time setting conditions for its consumption, the capacity for autonomy or self-management among education providers as well as “consumers” is severely diminished’ (Peters, Marshall, & Fitzsimmons, 2000, p. 127). A more serious concern that confronts school leaders is the tremendous challenge of balancing the multitude of pressing issues that accompany school transformations: the tug between entrenched practices and innovative approaches and the gulf between traditional mindsets and progressive thinking. This inquiry intends to explore this problématique by focusing

The role of school leaders, upper management (i.e. principals and VPs) as well as middle leaders (i.e. HODs and SHs) in the Singapore education system is an incipient theme that awaits further careful research and analysis. This article intends to make a contribution to this theme. On the one hand, the assumption that school leadership results in improved learning outcomes has been seen as an a priori condition. Yip categorically stated that in a decentralized system of education, the role of the principal is one that provides ‘strong educational leadership’ (Yip, 1982, p. 107). Chong and Low, recognizing the phenomenon that independent-like, autonomous schools would be more prevalent in a Singaporean context have identified a new executive role for the school principal which they label as ‘designer of school organization’ (Chong & Low, 1994, p. 52). Heng and Marsh, focusing on perceptions of middle leadership in Singapore schools argue that they see themselves as ‘adapting to and shaping change’ in schools by becoming ‘inspirational leaders and learners’ (Heng & Marsh, 2009, p. 533). On the other hand, even before school leadership or administration and its impact on school organization performance is assumed, a more fundamental issue to address should be in determining whether leadership and performance in school have any meaningful causal linkages. Murphy posits that contemporary education research reveals that ‘effective administrators’ producing ‘important organizational outcomes has yet to be definitively substanti- ated’ (Murphy, 1998, p. 112). Heck reinforced this concern when he argued that ‘previous research has not clearly defined instructional leadership or provided enough empirical evidence to demonstrate that principals who increase the amount and quality of time they devote to instructional leadership produce higher academic performance’ (Heck, 1992, p. 22). More recently however, Thorpe and Bennett-Powell have identified how middle leadership plays important roles in raising school standards (Thorpe & Bennett-Powell, 2014). Debates on the role of school leaders in the midst of decentralization and autonomy have undoubtedly had a storied history. This exploratory inquiry intends to engage with these debates by shedding light on sense-making of school leaders who find themselves in very unique contexts: localized decentralization amidst dynamic forces of globalization through specific ICT policy innovation.

Decentralization and autonomy within organizations have often been mentioned as precursors of genuine empowerment to occur. Empowerment of teachers has been suggested as a ‘necessary but not sufficient’ condition for improved student learning outcomes (Marks & Louis, 1997, p. 248). A related concept is transformational leadership recognized as essential in organizational change (Weiler, 1990, p. 434). Existing theories on various domains within schools (i.e. instructional organization of schools, authentic pedagogy and student academic performance) have attempted to map out how empowerment is shared and lived in the school (Koh, Steers, & Terborg, 1995, p. 320).
System-wide reform: ICT policy and implementation in Singapore schools

ICT has been identified as one of the ‘key contributors to Singapore’s economic success’, particularly in the manner that it has been strategically aligned and deployed ‘with the needs of the economy and society, as well as the coordinated efforts arising from the national ICT plans’ (Koh & Lee, 2008a, p. 167). Singapore has initiated two ambitious master plans (i.e. mp1 and mp2) and has jumpstarted a third master plan (i.e. mp3), all of which were designed to harness the benefits of ICT in harmony with the development objectives of the nation (Koh & Lee, 2008b). Much has also been written as insightful reflections of the experience of ICT in education. From a cross-national comparative perspective, Law underscored that ‘systems need to make leadership and teacher professional development initiatives promoting a strong school-based culture of support, professional collaboration, and shared decision-making a priority area’ towards the goal of bringing about ‘21st-century-oriented pedagogical uses of ICT in schools’ (Law, 2009, p. 37). In a Singaporean context, the ICT experience as driven centrally from the ministry of education (MOE) has been the continued provision of ‘top-down support for ground up initiatives from schools for routine ICT integration into the curriculum, but continues to adopt some form of centralized, top-down approach for novel integration of ICT into the curriculum that pushes the frontiers of teaching and learning’ (Koh, Lee, & Foo, 2009, p. 618). It is this seeming paradox: a move towards decentralization in education, yet a pronounced top-down approach in ICT policy implementation and how this impacts the role of school leaders that this inquiry intends to investigate.

A specific policy innovation that has taken place within the general policy framework of the ICT master plans is the rebranding of the so-called incubator schools into Leading Experimentation And Development or LEAD ICT@Schools Scheme in 2006. This programme supported schools ‘that conduct research on emerging ICT-based pedagogies’ and those ‘that want to experiment with existing ICT-based pedagogies at a significant scale’ (Koh & Lee, 2008, p. 72). Sixty-seven schools were selected to spearhead this innovation. After the launch of LEAD ICT@Schools, another ICT policy innovation followed suit in 2007: FutureSchools in Singapore or the FS@SG. These schools were targeted to ‘push the frontiers of teaching and learning practices at a school-wide level, fully harnessing ICT to bring about engaged learning’ (Koh & Lee, 2008, p. 72). Five schools chosen to be part of FS@SG performed the vanguard role of being ‘test beds’ in the ‘seamless journey’ of ICT in everyday school life (Wong, 2007, p. 1). Schools that have chosen to participate in these policy innovations received ‘additional funds for ICT implementation’ (Koh & Lee, 2008, p. 285).

Research on teachers’ perceptions of ICT in schools has yielded very interesting perspectives. In a five-year study encompassing 8000 participants and 12 schools, empirical evidence reveals what teachers perceive as three obstacles in using ICT for learning and teaching: ‘(1) ICT-based
lessons are time-intensive; (2) time allocated in the timetable for the lessons is insufficient; and (3) the use of ICT is not required in national examinations’ (Tan et al., 2010, p. 3). Completed and ongoing empirical studies that have been made in an attempt to measure the effectiveness of ICT in Singapore schools have identified the need to do more focused research into ICT-enabled pedagogy (Looi & Hung, 2004) and some have also attempted to evaluate effectiveness from a policy and pedagogy perspective (Lim, 2007). However, this exploratory inquiry focuses on school leaders’ responses to reforms by specifically using ICT policy innovations in schools as the focal point of the inquiry. This investigation is also conscious of how ICT reforms in education follow ‘an international trajectory towards marketisation, privatisation, de-regulation and individualism’ and how these trends influence school actors (Pykett, 2009, p. 7). The initial questions are designed to illuminate discussion in relation to how established ‘institutions’—represented by the school and educational bureaucracy—or the introduction of innovative ‘ideas’, sometimes referred to as ‘policy paradigms’ (Hall, 1993, p. 276)—represented by recurrent education reform discourses—impact on how policies facilitate or coincide with changes (Lieberman, 2002).

Methodology

This exploratory inquiry is primarily qualitative focusing on building explanation from the grounds that have been found to be of practical and theoretical usefulness in educational research (Wilson, 1977). This inquiry conducted case studies of two schools that are heavily involved in ongoing ICT integration programmes in Singapore. These schools were purposefully selected as a theoretical sample—they represent two examples of leading-edge efforts of schools that explore the interaction of ICT in teaching and learning. A total of 4 FGDs and 10 interviews with selected school leaders were completed from 2012 till 2013. Targeted inquiries for school leaders (who were heavily invested in the integration of ICT into teaching and learning) were designed to explore the dynamics of policy learning as seen from ‘perspectives of key actors’ involved in the ‘implementation of specific policies’ in the midst of periods of reform (Reyes, 2009, p. 519).

These narratives were recorded in audio tapes and transcribed into working transcripts. An extensive review of documentation of the reform experiences prepared by the MOE, the target schools themselves and external studies made by researchers were used to triangulate the findings from this exploratory inquiry. Table 1 provides summary information about the selected schools in this inquiry.3

Role of researcher

One of the characteristics of qualitative inquiry is for researchers to be ‘the research instruments’ (Frankel & Devers, 2000, p. 120). It is thus important at the outset for the researcher to be fully transparent and to
be aware of ‘how their own characteristics and biases may shape the research results’ (Frankel & Devers, 2000, p. 121). Thus, it is necessary to succinctly describe the role of the researcher.

A former school teacher, chief of staff in an educational bureaucracy and school principal (not in Singapore), and as a research scholar investigating school transformations from international comparative perspectives, I have personally experienced school reform and the many challenges it presents to school leadership in a Philippine, Australian and US context. Apart from my ongoing work as an academic specializing on teaching and researching education policy and transformations in Singapore, I also work as a consultant to various international education reform initiatives. The impetus for this inquiry stems from my involvement with Singapore-wide ICT initiatives (from 2009 till the present) and the many issues that school leaders face in making sense of reforms.

This qualitative exploratory investigation was primarily a comparative case study. I am familiar with the two target schools having been an academic supervisor to teacher trainees undertaking practicum and as an independent facilitator of local and international guests keen on finding out ICT developments in a Singapore context. However, for this particular inquiry, my explicit role, which was communicated to all the participants, was primarily as researcher. Aside from the FGDs and interviews, I also participated in classroom observation activities and informal chats with different school personnel. Throughout the data-gathering exercise, I was constantly liaising with the school leaders, middle managers and teachers. The perspectives I have acquired, as a bureaucrat from a central office in a school system, as a leader in a specific school setting and as an active researcher–practitioner on issues of reforms provide me with some familiarity and appreciation of the myriad concerns involved in school transformations. The professional background I have acquired made me somewhat of an ‘insider’ in this inquiry, allowing me to have greater access, interpretation and appreciation of the value of ‘shared experiences’ as well as much more nuanced ‘understanding and clarity of thought’ (Labaree, 2002, p. 103). The FGDs and interviews allowed for constant, active communication and engagement between myself as critical researcher and school leaders paving the way for emerging ‘co-constructed
identities’ and ‘lived experiences’ during this inquiry (Mertkan-Ozunlu, 2007, p. 456). Much more importantly though, in order to ensure the maintenance of a critical stance, I consciously practised ‘uncomfortable reflexivity, a reflexivity that seeks to know while at the same time situates this knowing as tenuous’ (Pillow, 2003, p. 188). On a number of occasions, respondents shared unfavourable remarks about aspects of leadership programmes managed by the institution I was a part of. There were also instances when middle leaders related disapproving observations about their leaders (i.e. VPs, principals), individuals whom I have worked with as academic trainer. In these uncomfortable situations, I reiterated to the respondents that we were all engaging in professional, albeit critical conversations in a safe space, giving voice to stakeholders trying to make sense of change. Consequently, in pursuing this inquiry, insights derived do not necessarily arrive at a ‘comfortable, transcendent endpoint’ but are in fact ‘messy’ and ‘may not always be successful’ (Pillow, 2003, p. 190).

Data analysis

A fundamental assumption that this inquiry makes is that schools or, broadly speaking, educational organizations are loosely coupled systems (Weick, 1976). Adding to the internal complexity of the school organization are fluctuating external factors that impinge on the operations and functions of schools. The forces of globalization and knowledge-based economies (KBEs) with its mantra of flexibility and adaptability are just some of the overpowering external factors that have altered how schools and educational systems function. Within the Singapore context, this complication is greatly heightened when relatively untested educational reform efforts are introduced to an already complex system. The targeted inquiries attempt to interrogate the dynamics of the intersection of policy change and a key agent in educational organizations: school leaders.

Consistent with the national goals of Singapore to use ICT as an ‘external wing to compete in the global marketplace’ (Information Communication Technology Working Group [ICT-WG], 2012, p. 3), schools and school leaders are seen to play key roles in pushing for ubiquitious ICT use in schools. Schools participating in the LEAD@ICT programme, such as those covered in this exploratory study, are seen to play the vanguard role in creating an ‘external wing’ leveraging on ICT in the Singapore education system. Thus, the key goal for school leaders is to play the important role in providing the direction and creating the conditions for students to use ICT in a meaningful way.

The inquiry made preliminary systematic attempts to identify how certain policies get adopted/modified/rejected as norms in the school organization, in a word, the policy cycle that occurs in schools (Finnemore & Kathryn, 1998). The questions also attempted to explore relationships that transpire between policy diffusion—in this case, ICT innovations— from the perceptions of school leaders. Investigation was made about the convergence and divergence of various coalitions. Questions were designed to discover what school leaders perceived in relation to four
broad aspects that usually acquire great significance during periods of reform, namely: (a) familiarity with ICT; (b) perceptions of what an ICT-integrated classroom looks like; (c) impact of ICT in teaching and learning; and (d) challenges of ICT in classrooms as these transpired whilst pursuing ICT innovation. Table 2 presents the areas of inquiry explored during the interviews and FGDs for this exploratory study.

After conducting analysis of interviews and FGD transcripts of the various school leaders from the two selected schools, a preliminary analytical map was formulated. Attempts at qualitative research produce insightful thick descriptions (Easterby-Smith, 1995) of issues and concerns that occur in schools, consistent with suggestions of Chong and Low about the need to explore these amongst school leaders in a Singapore context (Chong & Low, 1991). The analyses produced numerous concepts: these being notions or ideas that consistently surfaced out of the narratives of the different respondents across individual characteristics of the different types of leaders, and also across group characteristics (the different schools). With detailed analyses, explanations of the phenomenon under investigation beliefs, knowledge and practices of school leaders during periods of reform are developed through the process of abduction: generating ‘inference from observed facts’ (Richardson & Hans Kramer, 2006, 499). In attempting to do pattern-matching (see e.g. Goetz & LeCompte, 1984; Yin, 2003), specific categories linking several of the concepts were subsequently identified. From the numerous concepts that surfaced during the extensive analysis of FGDs and interview transcripts those that occurred most frequently were streamlined into 20. These were carefully reread and then arranged and synthesized to fall within six linked categories. By interrogating the narratives while using translation theories according to ANT, propositions were raised about these categories:

<table>
<thead>
<tr>
<th>Table 2. Areas of inquiry for the FGDs and interviews</th>
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<tr>
<td><strong>General areas of inquiry</strong></td>
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<tr>
<td><strong>Specific areas of inquiry</strong></td>
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<tr>
<td>ICT familiarity</td>
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<tr>
<td>How familiar are the leaders with new and emerging</td>
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<tr>
<td>technologies? How much does technology play a part in</td>
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<tr>
<td>their professional and personal lives? How comfortable</td>
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<td>are the leaders with technology?</td>
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<tr>
<td>Perceptions of an ICT-integrated Classroom</td>
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<tr>
<td>What does an ICT-integrated classroom look like? What</td>
</tr>
<tr>
<td>are the characteristics of this type of classrooms?</td>
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<tr>
<td>What kinds of teaching methodologies should one find</td>
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<td>in these types of classrooms?</td>
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<tr>
<td>Impact of ICT in teaching and learning</td>
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<tr>
<td>How has ICT influenced the way that teachers learn?</td>
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<td>How has ICT influenced the way students learn? From</td>
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<tr>
<td>the perspective of school leaders, how should ICT</td>
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<tr>
<td>impact teaching and learning?</td>
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<tr>
<td>Challenges of ICT in classrooms</td>
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<tr>
<td>From the point of view of school leaders? What are</td>
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<td>the biggest challenges of ICT in classrooms? What are</td>
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<td>the challenges that ICT pose to the way that teachers</td>
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<td>teach? What issues have arisen in relation to ICT and</td>
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<td>student learning?</td>
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are they related to each other? What causal linkages connect these categories with one another? What hierarchical linkages can be inferentially derived from them? Through an iterated process of abduction, these six closely linked categories were carefully analysed then synthesized leading to three components of sense-making experiences. The notion of ‘Shifting Identities’, particularly in relation to schools within an increasingly technological world was inferred by interrogating the two categories of ‘transactional leadership’ and ‘leadership in an artificial world’. ‘Emerging roles’, particularly in contexts where ICT reforms become ubiquitous in schools, was inferred by interrogating the related categories of ‘monitoring and evaluative leadership’ and ‘path-breaking leadership’. ‘Ambivalent capacities’, specifically in relation to tasks of advocating ICT reforms, came about after interrogating the derived categories of ‘leadership in uncertainty’ and ‘redundant leadership’. This process of abstraction becomes the basis for building explanation through ‘specifying conceptual relations’ derived from the entire qualitative data analytical experience (Wasserman, Clair, & Wilson, 2009, p. 378). The concept map in Table 3 is an attempt to ‘trace an actor–network’ of mediators and intermediaries (Latour, 2005, p. 133). Table 3 captures what the inquiry has generated from exploratory notions of school leaders’ experiences of sense-making of ICT policy reform through their narratives.

Discussion: sense-making in the midst of policy change

Given the national push for LEAD@ICT schools to perform their roles as ‘external wings’, in leveraging on ICT, to push their schools to fly greater heights, what were the experiences of these school leaders? What factors do they deem most important, most problematic and most complex as they attempted to implement ICT policy innovations? The analyses of the interviews, FGDs and observations produced illustrative accounts of how school leaders make sense of their experiences in the midst of change. The analysis from the interviews and FGDs surfaced several issues and challenges experienced by school leaders. From the process of abduction undertaken, three emerging actor-networks have been identified: shifting identities, emerging roles and ambivalent capacities. The next section investigates the actor-network relations where these leaders from both schools are embedded in the midst of ICT policy reform and in so doing, discover highly contextualized narratives of sense-making of school leaders, which this inquiry argues are a ‘viable instrument for cultural negotiation’ (Bruner, 1991, p. 17). Insights from this qualitative inquiry reveal that the selected school leaders’ sense-making narratives revolved around three key categories: identity, roles and capacities.

School as an artificial environment and the school leader’s identity

Respondents from Zenith Secondary acknowledged a shift in the identities that they had to perform as the duly-appointed leaders of the school. The introduction of ICT innovations had an impact not only on the roles that
<table>
<thead>
<tr>
<th>Actor–network relations</th>
<th>Categories</th>
<th>Concepts (Derived from content analyses of interviews and FGD transcripts)</th>
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</table>
| (Shifting identities) Leadership identities in a technology world | Transactional leadership          | Play the role of appeasing parents’ fears of ICT  
|                                                      |                                    | Appear to teachers unwilling to embrace ICT  
|                                                      |                                    | Notice (and point out) prevailing practices of frontal teaching even within ICT-enhanced classrooms  
|                                                      |                                    | Notice (and point out) persistence of traditional use of classroom environments  
|                                                      |                                    | Imperative to lead school towards high-stakes results  
| (Emerging roles) Emerging roles that leaders embrace in the midst of ICT reform | Monitoring and evaluative leadership | Leaders in an artificial environment (School)  
|                                                      |                                    | Struggle to balance preparation for high-stakes tests override authentic ICT learning  
|                                                      | Path-breaking leadership           | Difficulty in monitoring what students actually learn  
|                                                      |                                    | Struggle to contain increasing issues of cyberwellness amongst students  
|                                                      |                                    | Technology as a cloud and pushing the frontiers of teaching and learning  
|                                                      |                                    | Leader of professional learning communities  
|                                                      |                                    | Drivers of change (ICT driven)  
|                                                      |                                    | Technology role model (Using ICT in one’s work)  
|                                                      |                                    | Provide support to school stakeholders  
| (Ambivalent capacities) Perceived capacities (and recognized inabilities) needed to push for ICT reforms | Leadership in uncertainty         | Unpredictable future of technology and decisiveness of leaders  
|                                                      |                                    | The need to move forward despite uncertainty of policy innovation  
|                                                      |                                    | The constant need to take calculated risks  
|                                                      |                                    | The ability to become a reflective leader  

(Continued)
teachers played, but also on the way that school leaders guided these teachers. Using the translation theory from an ANT perspective, non-human ICT intervention—represented in this inquiry by learning devices (i.e. Apple IPad) became mediators, making an impact on the social relations that exist between school leaders and teachers.

On the one hand, school leaders had to embrace the purported changes that ICT innovation brought to the school, one of which was to move away from ‘frontal teaching’ typified by teacher talk and to move instead, towards the use of ICT that encouraged student-centred learning. As transactional school leaders, they were duty bound to point out to their teachers instances where ‘frontal teaching’ still persisted. On the other hand, school leaders recognized that they had to balance the demands of changing pedagogy with ICT innovations with the level of familiarity with new technology and the very real frustrations that may arise on the part of the teachers embarking on these reforms.

Because you see when you are doing frontal teaching, it’s really the teachers reinforcing their self-value and their self-worth, as a teacher. However, with the introduction of ICT innovations, these teachers keep facing a lot of like, failure, like, you know, going to class, adopting an innovation and then the students were not listening to him or that the students were just doing whatever they want, whereas some other teachers don’t have that problem. Thus, the teacher does feel a lot of frustration. (Ms L. of Zenith Secondary, June 2012)

Acme Primary and Zenith Secondary school leaders recognize the paradox of schooling in an age of ubiquitous ICT. This becomes starkly acute when innovations that seem to flourish in classroom environments that embrace open, student-centred approaches using ICT are forced to take a back seat when pupils (and schools) are faced with the challenge of satisfying high-stakes tests. One paradox that challenges the identities of leaders is whether to champion ICT reforms that promote openness or to resort to traditional approaches of preparing students in the face of high-stakes tests:

There is a great fear of loss because all this drilling actually has produced excellent results and we obtained so many awards. There is a fear among us of letting go. The challenge is to see whether abandoning ‘drill and kill’ and shifting to learner-centred approaches through ICT would necessarily mean that the results go down. (Mdm L. of Acme Primary, May 2013)
The move to embrace greater ICT use in schools has also engendered another perplexing implication to the shifting leadership identities of the respondents. As leaders of both schools struggled to search for ICT approaches that were the best, most effective and safest (i.e. cyberwellness), they constantly encountered the realization of the inadequacy of schools to address all the most-relevant issues that could face the learning child. Respondents recognize that with the deliberate move towards more-intensive ICT-integrated education, the school’s trait as an artificial environment becomes much more pronounced. Consequently, in an emerging landscape where ICT and the social learning environment of pupils converge, the challenge is to situate within a shifting context, the appropriate identity of the school leader.

We are not going to pretend that this approach or that approach is the best ICT approach. Fine, we see that the high-stakes tests marks in the ‘O’ levels seem to be high. But we have to acknowledge that our kids and the life outside of school interacting with technology in a certain way and their life within school and technology, there is no comparison. The school is such an artificial environment. If we talk about the whole child, a large part of their experiences with technology is parked outside the school. And this is technology is something that the school, our teachers are not even ready to deal with. (Ms E. of Zenith Secondary, June 2012)

Technology as a cloud and the emerging roles of school leaders

Respondents in this exploratory inquiry have revealed that in the midst of ICT reforms, the roles of leaders have undergone transformations. On the one hand, respondents from both Acme Primary and Zenith Secondary identify the persistence of some teachers who cling on to frontal type of teaching in the midst of ICT-enhanced classrooms (Ms M. from Acme Primary, May 2013 and Mr L. from Zenith Secondary, June 2012). On the other hand, leaders from both schools have indicated how their roles have changed: from leading a team of teachers who have been deliverers of knowledge towards leading a team of teacher facilitators:

So instead of being the deliverer of knowledge, our teachers today need to be the facilitator, to, teach student how to, gather information and process it so that it becomes knowledge. This is different from the teachers doing the information search and then processing it into data for the students. I think that is really the main difference for the teachers. … That it is no longer a world where one person knows all, but the information lies out there with everyone, and it is up to them to be able to pool information from different sources and to come up with an analysis of their own. (Ms S. of Zenith Secondary, June 2012)

One of the unmistakeable implications that an ICT-intensive curriculum has created in both schools is the increased exposure that all school stakeholders have towards ambiguity. To be more specific, for both Acme Primary and Zenith Secondary, teaching as well technology staff have been consistently sharing the latest applications (apps) that could be used for the various classes (Mr Z. from Acme Primary, May 2013 and Mr A. from Zenith Secondary, June 2012). Using the translation theory, it can be argued that the constant stream of classroom-based applications that are developed act as mediators creating various types of impact on social
relationships between school stakeholders. Leaders from both schools recognize this and have described technology as a powerful and borderless platform for collaboration. In such a scenario that is filled with ambiguity, school leaders from the two case studies have adopted the role of path-breaking leadership:

What I think is good about technology would be, collaboration. If we think about the future of technology as living in the cloud, I think that it has great opportunity for the school to develop beyond the classroom. It’s not just me and my colleagues and friends here in school, but friends and colleagues, from all over the place to create content. (Mr L. of Zenith Secondary, June 2012)

Unpredictable future of technology and its implications on school leaders’ capacities

Respondents selected for this exploratory inquiry indicated that leaders’ perceptions of their leadership capacities have undergone changes under the influence of ICT reforms in schools. Some are of the opinion that the fast-paced and seemingly never-ending changes brought about by ICT disempower some leaders. Specifically, with the advent of one-to-one computing for both Acme Primary and Zenith Secondary, leaders have expressed difficulties in monitoring what goes on in the classroom and what students actually learn (Mrs F. from Acme Primary, May 2012 and Mr C. from Zenith Secondary, July 2013). Some leaders have even expressed bleak doubts on whether or not they would still remain relevant or obsolete in the face of all these rapid ICT developments that affect schools:

I have to really rethink then when the school really has moved the technology, then, the school leaders, what is our role? If all these teachers can go to class and engage the students so well in technology and they’re really at that high level of engagement if that day really comes, will I be obsolete or not? (Mdm. M. of Zenith Secondary, June 2012)

However, most of the respondents from the FGDs and interviews from both Acme Primary and Zenith Secondary posit that quite a number of them and their colleagues have become empowered by the possibilities that ICT bring along with it. A specific area which manifests empowered leaders can be gleaned from the surge of collaborative learning among leaders in both schools:

But we’re trying to use a different platform now, to guide the students in their learning. So it really, causes the teachers to sit in our learning community and think. How should I use this different platform, in terms of designing our teaching and pedagogies? I also think that our learning circle, our community where set aside time for discussion, as a whole and sharing within our department about how one teacher uses it this way, another teacher uses it that way, and sharing of applications and resources. (Mrs K. from Zenith Secondary, June 2012)

Alongside what has been described as empowerment through their active leading and participation in learning communities, respondents have also mentioned the need to develop leadership capacities that confront
uncertainties. One of the school leaders of Zenith Secondary explicitly stated how vital it is for leaders to move even if most of the time ‘you can’t tell what lies ahead, but if you do not jump on the bandwagon you find that you’ll be left behind, and eventually you really cannot resist that, advancement, and by that time you would already be left behind’ (Mrs Q. from Zenith Secondary, June 2012).

How do school leaders navigate educational reform?

This inquiry attempted to map out the sense-making experiences of leaders of two schools that undertook ICT-intensive reforms in their teaching and learning. In order to sketch this map, the narratives of the school leaders were used as the bases for inquiry. Combining this approach with the analytical lens of translation theory found within ANT, this inquiry attempted to capture traces of the social and relational interactions of school stakeholders as well as non-human actors’ (i.e. ICT tools) represented by actor-networks. Narratives are powerful sources of tracing these actor-networks:

Narrative is a conventional form, transmitted culturally and constrained by each individual’s level of mastery and by his conglomerate of prosthetic devices, colleagues, and mentors. Unlike the constructions generated by logical and scientific procedures that can be weeded out by falsification, narrative constructions can only achieve ‘verisimilitude.’ Narratives, then, are a version of reality whose acceptability is governed by convention and ‘narrative necessity’ rather than by empirical verification and logical requiredness, although ironically we have no compunction about calling stories true or false. (Bruner, 1991, p. 4)

This exploratory inquiry on the perceptions of selected school leaders provided an interesting snapshot of issues and challenges in the midst of reform. School leaders in periods of reform provide insights on their sense-making experiences represented in this inquiry as actor-network relations: (1) shifting identities of leaders in an increasingly technology-driven setting; (2) emerging roles that leaders embrace in the midst of ICT reforms and (3) ambivalent capacities (and recognized inabilities) needed to push for ICT reforms. These experiences reported by the respondents prove to be rife with tensions and contradictions. Nonetheless, one common thread that permeates the sense-making experiences of the two sets of school leaders is the need to move forward in spite of the uncertainties that ICT technology may bring to schools:

At the end of it really it’s a judgmental call. Technology is futuristic in a sense and we really don’t know what trajectory it would go. I mean a lot of the devices we have now did not exist a few years ago. A lot of the decisions we make is a judgment call. So, I think, for us the really important question is, how do we make decisions, how do you make judgment calls when so many things are uncertain? (Ms E. of Zenith Secondary, June 2012)

Policy learning by verisimilitude

By mapping out the sense-making experiences of school leaders through their narratives, this inquiry provides explanations to the policy learning
processes in schools whilst in the midst of ICT reforms. Mechanisms of policy learning have conventionally been described through three patterns. Firstly, it is seen as a product of the contagion effect (i.e. Actor A learns a policy innovation by hearing, seeing or studying what Actor B has successfully undertaken) (e.g. Ramirez, Soysal, & Shanahan, 1997). Secondly, policy learning is seen as a result of an external principal agent dictating how policy should be transformed or implemented (i.e. Actor Z compels Actor A to adopt certain policies) (e.g. Finnemore, 1993). Finally, it can also be understood as an outcome of actors adopting universally accepted norms to further their own narrow interests (i.e. Actor C adopts certain policies and modifies them in order to suit Actor C’s agenda) (e.g. Cortell & Davis, 1996).

How do school leaders navigate ICT educational reform—a futuristic path—fraught with ambiguities? How do school leaders implement policy reforms and, more importantly, learn from these experiences and experiments whilst dealing with unpredictable streams of ICT developments and their equally unforeseeable outcomes? Do they achieve policy learning or are they actually undertaking policy appropriation, which is nothing more than ‘inert borrowing from elsewhere’ (Lingard, 2010, p. 144)? Or is their policy learning achieved through comparing with what others have already achieved, also known as benchmarking (Lundvall & Tomlinson, 2002)? Based on the findings of this exploratory inquiry, it is argued that school leaders involved in leading-edge ICT-intensive reforms undergo policy learning by verisimilitude. Unlike conventional explanations of policy learning such as the contagion effect, external principal agent dictating change or local actors adopting universal norms for their narrow agenda—all of which operate within relatively predictable parameters—the school leaders in this case study, manoeuvred their respective organizations without the benefit of foreseeable boundaries. The unpredictable nature of ICT developments hindered them from being able to carefully plot their next moves. Nonetheless, based on the hazy and intermittent insights gained through experimentation and learning by doing through various stages of ICT reform, the leaders were guided by verisimilitude or what Bruner described as ‘a version of reality whose acceptability is governed by convention and “narrative necessity” rather than by empirical verification and logical requiredness’ (Bruner, 1991, p. 4).

One of the serious challenges that face the city–state and one of its key institutions—MOE and its schools—in preparing the nation for an uncertain future is the extent of learning and change that it is willing to undertake. Recognizing the entrenched traditional mindsets inherent in the education system and the need for creativity and innovation, the system itself must have the capacity to engage in learning which implies that ‘the organization’s members are induced to question earlier beliefs about the appropriateness of ends of action, and to think about the selection of new ones, to revalue themselves’ (Haas, 1991, p. 73). One may argue that the extent of organizational learning required is not merely adaptation which is ‘muddling through’ (Haas, 1991, p. 75) or ‘incrementalism where subsequent policy decisions are carried out as a mechanical continuation
of previous decisions’ (Van Meter & Van Horn, 1975, p. 465), but a deep change that is willing to re-evaluate core beliefs (Sabatier, 1988).

This exploratory inquiry recommends that education systems at the forefront of reforms such as Singapore need to fully embrace new paradigms and to attain deeper and more authentic policy-oriented learning (Sabatier, 1988). Achieving learning and not mere adaptation requires grappling with the fundamental issue of whether it would be ‘possible to bring about changes in teachers’ beliefs, values, and attitudes concerning such matters as epistemology, the roles of teachers, and the nature of teaching and learning’ (Tan & Gopinathan, 2000, p. 10). The experience of the schools in this exploratory case study—particularly what this inquiry posits as policy learning by verisimilitude provides an intriguing response to the question of attaining deep learning in schools as a precursor of system-wide change. Hopefully, future research about ICT reforms in various contexts could interrogate and critique findings from this exploratory study. In this way, policy learning—in an increasingly unpredictable twenty-first-century setting—thrives and continues.

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Notes

1. The main ethnic groups for the Singapore resident population (this includes Singaporean citizens and Permanent Residents) are Chinese (74.1%), Malays (13.4%), Indians (9.2%) and Others (3.3%). More information can be obtained from the Singapore Department of Statistics 2013.
2. The 2009 instrumentation and baseline study was designed to evaluate the implementation of IT Master Plan 3 and its impact on Singapore schools. The study was undertaken by a team from the National Institute of Education, Nanyang Technological University, Singapore.
3. In order to honour the confidence of those persons who were interviewed in the course of this research, their names and complete job designations are omitted here. Nonetheless, where data source is reported from an interview, the interviewee is identified by their position.
4. In order to preserve the anonymity of the schools, their actual names are not provided.

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