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Sense-Making of Teachers in the midst of Information Communication Technology (ICT) Reforms in Schools: An Exploratory Case Study

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Sense-Making of Teachers in the midst of Information Communication Technology (ICT) Reforms in Schools: An Exploratory Study in a Singapore Context

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Abstract

This qualitative research inquiry attempts to explore how school teachers cope with the incessant and seemingly endless transformations that occur in schools. The central phenomenon to be studied focuses on how school teachers “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 that took part in policy reform initiatives directed at ubiquitous use of Information Communication and Technology (ICT) would be the locus of this inquiry. Using Actor-Network Theory (ANT) as an analytical frame, for the Focus Group Discussions (FGDs) and interviews, this inquiry investigates and builds emerging explanations to school teachers’ sense-making experiences in periods of reform.

Keywords: Information Communication and Technology (ICT), Singapore, Reform, Policy, Teachers, Sense-Making

INTRODUCTION

This qualitative research inquiry attempts to explore how school teachers situated within the island city-state of Singapore cope with the incessant and seemingly endless transformations that occur in schools. This article attempts one general question: How do Singapore school teachers make sense of the introduction of ubiquitous Information Communication Technology (ICT) usage in schools? The central phenomenon to be studied focuses on how school teachers —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 that took part in policy reform initiatives directed at the use ICT would be the locus of this inquiry. Using findings from Focus Group Discussions (FGDs), interviews and observations, this inquiry investigates and builds emerging explanations to school teachers’ sense-making experiences with the introduction of ICT in schools.

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

1 This research was supported by a grant from the Office of Education Research (OER), National Institute of Education (NIE). The Principal Investigator of this research project is the author. The author acknowledges Dr. Catherine Chua as Co-investigator for this project. The contents of this article are solely the responsibility of the author and do not necessarily represent the official views of OER-NIE.
methodological 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 teachers perceive changes and continuities on their identity, analysing their emerging sense of agency and emphasising on the varying sense of ownership that teachers experience. The fourth and final section provides a reflection on the future trajectories that teachers face as ICT becomes a pervasive component of teaching and learning in schools.

SENSE-MAKING EXPERIENCES: IDENTITY, AGENCY AND OWNERSHIP

This inquiry 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. 33), where skills and knowledge that they have acquired clash with new technologies. This inquiry argues that teachers who find themselves in these disjunctures undergo sense-making experiences consisting of creating meaning that is constantly modified through their social and contextual interactions (Schmidt and Datnow, 2005). For this exploratory inquiry, the meaning making encounters of the teachers in the midst of reform are viewed from the perspectives of identity, agency and ownership. Identify formation emerges as one of the fundamental reactions to these experiences. School teachers 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 teachers —who can also be referred to as policy actors -- navigate through various waves of education reform disjunctures they make choices that either empower them or disempower them. In a word, their sense-making experiences impact on their sense of agency. Aside from identity and sense of agency, the inquiry also affirms that whilst attempting to make sense, teachers also experience decisions that impinge on their sense of ownership. Policy actors, and in this inquiry—school teachers – in the midst of sense making —are able to provide accounts of this activity, which then become the measures by which they are evaluated and made sense of by others (Koyama, 2011, p. 23). These theoretical assumptions continue current debates on how educational innovations impact teacher’s positioning (Ketelaar et al., 2012).

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 remarkable economic progress is matched by the nation’s commitment to education investments. For instance from 1997/98 to 2011/12, the government’s recurrent expenditure in education averaged a steady increase of almost 7.5% (Ministry of Education-Planning Division, 2012). 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.² The 1996 Third International Math and Science Study (TIMSS) acknowledged that Singapore was one of

² 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 2011.
the top performing countries in 3\textsuperscript{rd} and 4\textsuperscript{th} grade Mathematics (Mullis et al., 1997) and the best performing country in 8\textsuperscript{th} and 9\textsuperscript{th} grade Science (Beaton et al., 1996). In the 2003 version of TIMMS, Singapore emerged once again as one of the top-performing countries in 8\textsuperscript{th} and 4\textsuperscript{th} grade Science and 8\textsuperscript{th} and 4\textsuperscript{th} grade Mathematics (Martin et al., 2003) and Progress in International Literacy Study (PIRLS) indicated that Singapore was one of the top three performing countries in its 2006 report (Mullis and 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, 2009). Guided by an elite corps of technocrats and leaders (Hill and 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). Today, the nation-state has received accolades as the world’s most globalized country (Kearney and 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, p. 1)

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 forty years ago. However, with the dawn of the 21\textsuperscript{st} century, Singapore faces different sets of vulnerabilities brought about by the forces of globalisation and competition from such rapidly developing economies as China and India. Burbules and Torres identified the 21\textsuperscript{st} century education problematic as a needed paradigm shift in —educational aims that have more to do with flexibility and adaptabilityll rather than the standardization that characterized the earlier industrial phase and greater harmony among peoples and among nations (Burbules and Torres, 2000, p. 22). The Prime Minister spoke about this when he identified education as an —effective strategyll which will enable us to survive and to thrive in a changing world (Lee, 2006).

**SYSTEM-WIDE REFORM: ICT POLICY AND IMPLEMENTATION IN SINGAPORE SCHOOLS**

ICT has been identified as one of the —key contributors to Singapore’s economic successll particularly in the manner that is 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 plansll (Koh and Lee, 2008a, p. 167). Singapore has initiated two ambitious master plans (i.e. mp1 and mp2) and has most recently 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 and 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 are all towards the goal of bringing about —21\textsuperscript{st}— century-oriented pedagogical uses of ICT in schoolsll (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 et al., 2009, p. 188). 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 teachers 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 re-branding 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 and Lee, 2008b, 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 and Lee, 2008b: 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). Schools that have chosen to participate in these policy innovations received—additional funds for ICT implementation (Koh and Lee, 2008a, p. 181).

Research on teachers’ perceptions of ICT in schools has yielded very interesting perspectives. In a five year study that encompassed 8,000 participants and twelve 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 on-going 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 and 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 teachers’ responses to reforms by specifically using ICT policy innovations in schools as the focal point of the inquiry. 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) — represented by recurrent education reform discourses — impact on how policies facilitate or coincide with changes (Lieberman, 2002). This exploratory inquiry attempts to explore school teachers’ responses to ICT reforms by focusing on their sense-making experiences.

**METHODOLOGY**

The inquiry is designed as a retrospective study of current ICT initiatives. The exploratory inquiry is primarily qualitative focusing on building explanation from the ground 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 on-

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3 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.
going 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. These schools are situated in the East, West, South, and North areas of Singapore. A total of four (4) FGDs and ten (10) interviews with selected school teachers were completed from 2012 till 2013. The targeted inquiries for school teachers (who were heavily invested in the integration of ICT into teaching and learning) were designed to explore the dynamics of education reform as seen from perspectives of school stakeholders in the midst of periods of reform (Mintrom and Vergari, 1998). These were recorded in audio tapes and transcribed into working transcripts as part of this exploratory inquiry. 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: Summary Statistics of selected schools applying ICT policy innovations

<table>
<thead>
<tr>
<th>School</th>
<th>Student Population</th>
<th>Staff Strength (not including management)</th>
<th>ICT Innovations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acme Primary School</td>
<td>1,200</td>
<td>60</td>
<td>One-to-One Computer Access to Allow for Integration of Various Primary School Courses</td>
</tr>
<tr>
<td>Zenith Secondary School</td>
<td>1,500</td>
<td>70</td>
<td>One-to-One Computer Access to Encourage Greater Engagement Among Secondary School Students</td>
</tr>
</tbody>
</table>


Role of Researcher

One of the characteristics of qualitative inquiry is for researchers to be —the research instruments] (Frankel and 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 result] (Frankel and 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, School Principal, and as a Research Scholar investigating school transformations, I have personally experienced school reform and the many challenges it presents to school leadership in a Philippine, Australian and American context. Apart from my on-going work as an academic specialising 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.

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4 In order to honor 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.

5 In order to preserve the anonymity of the schools their actual names are not provided.
In the conduct of this current study, my chief role was that of a participant-observer. I visited the two target schools as researcher, 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. Aside from the FGDs and interviews, I also participated in classroom observation activities and informal chats with different school personnel. All 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 policy transformations in schools. The professional background I have acquired made me somewhat of an —insiderll in this inquiry allowing me to have greater access, interpretation and appreciation of the value of —shared experiencesll as well as much more nuanced —understanding and clarity of thoughtl (Labaree, 2002, p. 103). The FGDs and interviews allowed for constant, active communication and engagement between myself as critical researcher and the school leaders paving the way for emerging —co-constructed identitiesll and —lived experiencesll during the conduct of this inquiry (Mertkan-Ozulu, 2007: 456). Much more importantly though, in order to ensure that I as researcher and research instrument with an insider advantage maintain a critical stance, I consciously practised —uncomfortable reflexivity — a reflexivity that seeks to know while at the same time situates this knowing as tenuousll (Pillow, 2003, p. 188). Consequently, in pursuing this exploratory qualitative inquiry the insights derived do not necessarily arrive at —comfortable, transcendent endpointll but are in fact —messyll and —may not always be successfull (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 school organisation 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 teachers.

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 ubiquitous 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 wingll leveraging on ICT in the Singapore education system. Thus, the key goal for school teachers 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 and Sikkink, 1998). The questions also attempted to explore relationships that transpire between policy diffusion — in this case, ICT innovations -- from the perceptions of school teachers. Investigation was made about the convergence
and divergence of various coalitions (Sabatier, 1988) networks (Mandell, 1999; Lieberman and Grolnick, 1996) and communities (Wenger, 1998; Busher et al., 2007) of teaching professionals experiencing reforms in schools. Questions were designed to discover what school teachers 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:

**Table 2: Areas of Inquiry for the FGDs and Interviews**

<table>
<thead>
<tr>
<th>General Areas of Inquiry</th>
<th>Specific Areas of Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT Familiarity</td>
<td>How familiar are the teachers with new and emerging technologies? How much does technology play a part in their professional and personal lives? How comfortable are the leaders with technology?</td>
</tr>
<tr>
<td>Perceptions of an ICT-integrated Classroom</td>
<td>What does an ICT-integrated classroom look like? What are the characteristics of this type of classrooms? What kind of teaching methodologies should one find in these types of classrooms?</td>
</tr>
<tr>
<td>Impact of ICT in Teaching and Learning</td>
<td>How has ICT made an impact on the teaching and learning practices in classrooms and in schools? How has IC influenced the way that teachers learn? How has ICT influenced the way students learn? From the perspective of school leaders, how should ICT impact teaching and learning?</td>
</tr>
<tr>
<td>Challenges of ICT in Classrooms</td>
<td>From the point of view of school teachers? What are the biggest challenges of ICT in classrooms? What are the challenges that ICT pose to the way that teachers teach? What issues have arisen in relation to ICT and student learning?</td>
</tr>
</tbody>
</table>


After conducting content 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 Low and Chong about the need to explore these amongst school leaders in a Singapore context (Chong and Low, 1991). The content analyses produced numerous concepts: These are notions or ideas that consistently surfaced out of the narratives of the different respondents across individual characteristics of the different types of teachers and also across group characteristics (the different schools). With content analyses, explanations of the phenomenon under investigation beliefs, knowledge and practices of school teachers during periods of reform are developed through the process of abduction: generating —inference from observed facts‖ (Richardson and Hans Kramer, 2006, p. 499). In attempting to do pattern-matching (see for example (Yin, 2003; Goetz and LeCompte, 1984), specific categories linking several of the concepts were subsequently identified. From the numerous concepts that surfaced during the extensive content analysis of FGDs and interview transcripts those that occurred most frequently were streamlined into fifteen. These were
carefully re-read and then arranged and synthesized to fall within three linked categories. Propositions were then raised about these categories: How 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 linked categories were then synthesised and led to three components of sense-making experiences. This process of abstraction becomes the basis for building explanation through —specifying conceptual relations— derived from the entire qualitative data analytical experience (Wasserman et al., 2009, p. 378). Table 3 captures what the inquiry has generated from exploratory notions of school leaders’ experiences of sense-making of policy reform, implementation and the accompanying issues and challenges.

Table 3: Insights derived from Interview Transcripts and FGDs

<table>
<thead>
<tr>
<th>Sense-Making Experiences with the Use of ICT</th>
<th>Categories</th>
<th>Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Teachers’ Emerging Identities</em></td>
<td>Teachers as Facilitators</td>
<td>(Derived from content analyses of interviews an FGD transcripts)</td>
</tr>
<tr>
<td></td>
<td>Teachers Roles from Content Provider to Manager of Content for Students</td>
<td></td>
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<tr>
<td></td>
<td>Reflective Teacher</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Prevalence of Frontal Teaching even within ICT-enhanced classrooms</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Persistence of Traditional Use of Classroom environments</em></td>
<td></td>
</tr>
<tr>
<td><em>Sense-Making Experiences with the Use of ICT Reforms Schools</em></td>
<td>Collaboration among Teachers as a Form of Professional Development</td>
<td></td>
</tr>
<tr>
<td><em>Teachers’ Sense of Agency</em></td>
<td>Teacher’s Ability to Cater to Differentiated Learning for Students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teacher’s Ability to use ICT to extend students’ classroom</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Difficulty in monitoring what students actual learn</em></td>
<td></td>
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<tr>
<td></td>
<td><em>Increasing issues of cyberwellness</em></td>
<td></td>
</tr>
<tr>
<td><em>Teachers’ Sense Ownership</em></td>
<td>Teacher’s Enthusiasm to form Professional Learning Communities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teacher’s actively pursue learning by modelling ICT use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teacher’s champion ICT innovation and initiatives</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Connectivity problems that hamper ICT usage</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Preparation for High-Stakes Tests override authentic ICT learning</em></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* From —Report on a Case Study of Policy Learning and ICT Reforms in Education,— by V. Reyes, 2013, p. 18
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 teachers in the midst of all these? 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 teachers make sense of their experiences in the midst of change. These accounts are analogous to studies of the learning trajectories of school teachers reflecting on their roles in learning processes within periods of change. Insights from this qualitative inquiry reveal that the selected school teachers’ sense-making experiences revolved around three key categories: identity, sense of agency and sense of ownership.

Teachers’ Emerging Identities

Selected respondents in this exploratory inquiry have revealed that in the midst of ICT reform the role of teachers undergo transformations. On the one hand, respondents from both Acme Primary and Zenith Secondary identify the persistence of some traditional 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, a greater number of teachers in these two schools – as indicated by the respondents – have transformed their roles form purveyor of knowledge towards a more facilitative role:

For me I would say that the whole ICT initiative itself is actually moving from teacher-centered and approaching towards more student-centered pedagogy, so actually in a way, the whole process itself is not an easy process and, involves a lot of patience and then also we have to facilitate the process itself how the evolution actually take place, over here. I see how teachers’ roles evolved from initially like single, source of authoritative knowledge with content, to now become slowly, less -- how to say -- maybe less authoritative, but at the same time also become the main facilitator for the students’ learning (Mr. L. of Zenith Secondary, June 2012).

Teachers’ Sense of Agency

Respondents selected for this exploratory inquiry indicated that teachers’ sense of agency 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 teachers. Specifically, with the advent of one-to-one computing for both Acme Primary and Zenith Secondary, teachers 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). Most respondents however from both Acme Primary and Zenith Secondary posit that quite a number of their colleagues have become empowered by the possibilities that ICT bring along with it. A specific area which manifests empowered teachers can be gleaned from the surge of collaborative learning among teachers in both schools:

I think for me well, enhancement of, teaching and learning and all that engagement I mean I’m struggling with having to say, well this is how, the current generation of students learn and work. And we collaboratively bring it,
to them, or that we draw them to, us. I mean, that sometimes is a little bit like, you know, do we, and sometimes some people will consider or reduce ourselves to their level, or that, technology must be able to really just enhance, you know, draw them out of whatever their lack of motivation or whatever it is to impacts their learning. What I think is good about technology would be, collaboration as a form of professional development for us teachers. If we think about the future of technology as living in the cloud, then I think, that has great opportunity far beyond the classroom type learning, it's not just me and my teacher colleagues here, but we have other collaborators, all over the place to create content. So I think that, that is one potential for collaborative learning (Mrs. T of Zenith Secondary., June 2012).

**Teachers' Sense of Ownership**

The FGDs and interviews of selected participants from Acme Primary and Zenith Secondary have revealed how ICT reform impacts on teachers’ sense of ownership. Some school teachers express that the introduction of ICT have somehow increased their perceived levels of isolation from the demands of learning. Whereas, most of the ICT initiatives promote innovation and collaboration among students, some teachers have indicated how the persistence of a high-stakes testing culture diminishes the efficacy of ICT (Mrs. N of Acme Primary., May, 2013). However, there are teachers who have reported that ICT serves as a powerful platform for communities of learning to emerge:

So I mean the professional learning in terms of sharing among colleagues, I think to be a little bit more innovative, not that we’re not innovative. But we’re trying to use a different platform now, to, you know, to guide the students in their learning. So it really, you know, causes the teachers to sit in our learning community and think, really, how then should I use this different platform, in terms of designing our teaching and our pedagogies, and also I think that that our learning circle, that community that we had, where we, we had time set aside for discussion, as a whole and also, when we, within our own departments, when there’s -- you know-- sharing within our department about how one teacher use it for this, in this way, another teacher uses it that way, and the sharing of, applications and resources, really is also more of a resource bank, sometimes in terms of the podcast and the iTunes use and things that they use (Mrs. K. from Zenith Secondary, June 2012).

**ISSUES AND CHALLENGES: TEACHERS’ SENSE-MAKING IN PERIODS OF REFORM**

This exploratory inquiry on the perceptions of selected school teachers provided an interesting snapshot of issues and challenges in the midst of reform. School teachers in periods of reform provide insights on their sense-making experiences that centre around three key categories: (1) Emerging sense of a teacher’s identity; (2) A growing sense of agency among teachers and (3) an increasing sense of ownership among teachers. These experiences reported by the respondents to this exploratory inquiry prove to be fraught with tensions and contradictions. Perhaps one way for school teachers to —make sensell of the seeming paradoxes of school reform would be to strike a balance between —deep learningl as these are mandated by wide-scale change enacted in the discourse of ICT reforms in schools and —adaptationl emanating from the desire to preserve some school teachers believe is what works and to keep to the —tried and testedl approaches.
Indeed 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: 75) or —incrementalism where subsequent policy decisions are carried out as a mechanical continuation of previous decisions‖ (Van Meter and Van Horn, 1975, p. 465) but a deep change that is willing to re-evaluate core beliefs (Sabatier, 1988). Gopinathan points out a more profound extent of the necessary changes.

At the school level, change, while it is occurring, is not yet fundamentally changing pedagogy and practice. Teachers having to cope with large classes, a content dominated curriculum and high stakes examinations have taken on initiatives like thinking skills but rather than allow for a reconceptualisation of practice have, in many cases, bolted on acceptable elements and routinised procedures—a technique-oriented view of creativity prevails. (Gopinathan, 2007, p. 67)

What is required by the education system and the schools is a bold attempt to embrace new paradigms and to attain —deep learning‖ (Ng, 2005, p. 5). 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 and Gopinathan, 2000, p. 10). It must be pointed out that in order for systemic wide change to occur —one that is encapsulated in the lofty goals of ICT in teaching and learning in schools ——educational innovation is first and last about teachers and students, where they begin, what they experience, and where they end up‖ (Luke et al., 2005, p. 26). In facing the challenges, uncertainties and complexities that forces of globalization bring with it, Singapore’s deliberate attempts to become a —learning organization‖ while steadfastly adhering to shared core values puts great pressure on how school teachers make sense of it all in the midst of school reform.
Reference List


Gurria, A., (2010), Presentation of the PISA 2010 Results, Washington: OECD.


Pillow, W., (2003), —*Confession, catharsis, or cure? Rethinking the uses of reflexivity as methodological power in qualitative research*, International Journal of Qualitative Studies in Education 16, pp. 175-196.