A socio-cultural perspective to teacher adaptivity: The spreading of curricular innovations in Singapore schools

Abstract

This paper addresses how 21st century learning cultures can be enabled and spread in the Singapore school system by enacting curricular innovations and developing teachers’ capacity for adaptivity. We appropriate understandings of adaptivity, including adaptive expertise, and contextualize it to the Singapore school system at the socio-cultural level of analysis. Our focus is on the socio-cultural enablers mediated by curricular innovations that influence teachers’ learning of adaptivity. This socio-cultural perspective of teacher adaptivity is our contribution. The case study reveals that 21st century learning cultures and developing teachers’ adaptivity are enabled by: 1) school leadership creating socio-technological provisions for teacher experimentation and innovation; 2) learning contexts that re-orientates pedagogy, curriculum, and assessment; 3) learning communities that build teacher capacity; and 4) historicity for developing adaptivity. While enablers can be appropriated from this case study to show how teacher learning occurred within the school, the spreading of teacher adaptivity to other schools cannot be naively replicated. We discuss these issues and postulate that diffusing teacher adaptivity requires leadership and socio-cultural dimensions to enact a process of teacher learning across schools for practices to be diffused.

Keywords: adaptivity, teacher learning, curricular innovations, 21st century learning culture, socio-cultural
Introduction

The 21st century is a connected global environment. Schools are at a “tipping point” (Kay, 2010). There is widening gap between what students learn and the 21st century competencies needed to handle complex situations in the workforce (Voogt & Roblin, 2012).

Since the 1970s, Singapore has emphasized academic achievements (OECD, 2011). The routine, instructional regime stresses teacher talk and coverage of curriculum to ensure performances in national and international benchmark assessments (Hogan, 2014; Mourshed, Chijioke, & Barber, 2010). Moving forward, 21st century competencies are vital for societies, including Singapore (Yue, 2001). We have to develop adaptivity in teachers, students, and the education system (Hung, Lee & Lim, 2014). This context sets the background for diffusing curricular innovations to influence teacher learning and school practices toward 21st century orientations. Teacher-centered and 21st century pedagogies are important. The issue is to adaptively employ different methods and the extent of use (Hogan, 2014). Although these approaches seem paradoxical when interwoven, it is the managing of these contradictory dualities, which characterizes adaptivity (Hung, Lee, & Vishnumahanti, 2014).

A study of education systems shows that curricular innovations are common interventions for change (Mourshed et al., 2010). These innovations transform individuals, cultural, and social systems (Mourshed et al., 2010; Priestley, 2011). In this paper, we showcase a case study of school-based, curricular innovation. We use a socio-cultural lens to consider, “what are the socio-cultural enablers mediated by curricular innovations that influence teacher adaptivity?” We consider how adaptivity as an individual’s disposition (Koh, Hong & Seah, 2014) may be viewed from a socio-cultural lens where teachers’ learning of adaptivity goes beyond the individual and is inextricably linked to school’s social context, practices, and learning cultures. We draw lessons on how spreading teacher
adaptivity can be possible; but recognize that it cannot be replicated because socio-cultural 
practices and contexts differ. This highlights the inextricable link between socio-cultural 
context and learning.

**Literature Review**

**Adaptive Expertise**

Hatano and Inagaki (1986) conceptualize adaptive expertise which is subsequently 
adapted by Bransford, Brown, & Cocking (2000). Routine experts excel in mundane 
performances in familiar contexts. In contrast, adaptive experts exhibit flexibility in unique 
situations (Holyoak, 1991; Barnet & Koslowski, 2002). They cross boundaries to explore 
novel solutions. They handle ill-structured problems through self-regulation and knowledge 
creation (Bransford et al., 2000; Lee, Hung, Lim, & Shaari, 2014).

Adaptive experts know their assumptions and beliefs. They question, modify, and 
experiment new procedures (Hatano & Inagaki, 1986). Being adaptive requires learning 
from failures and habits of mind (Beattie, 1997; Hung, Shaari, Lee, & Lee, 2014; Riel & 
Vahey, 2005). To date, adaptive expertise is construed from an individual unit of analysis 
(Koh, Hong, & Seah, 2014).

Appropriating this concept, schools need to nurture flexible and adaptive learners. We 
believe an education system would improve from adapting new cultures of learning (Hung, 
Lee, & Lim, 2014; Hung et al., 2014). In Singapore, teachers develop routine expertise that 
stress drill-and-practice for academic outcomes (Hogan, 2014). This is evident in Singapore’s 
success in international studies such as the Programme for International Student Assessment 
(PISA) (Teh, 2014). Singapore recognizes that curriculum innovations enable transformations 
by balancing teacher-centered approaches and 21st century learning to create hybridized 
pedagogies. Teachers develop adaptivity to toggle or hybridize 21st century pedagogies with
teacher-centered approaches to deliver knowledge, develop dispositions and maintain performances (Lee, Hung, & Teh, in-press).

This context motivates our research where curricular innovations, with their socio-cultural dimensions, become mediators for school change as teachers develop adaptivity and experiment with supportive leadership and learning communities (Beattie, 1997; Hung, Lee, & Vishnumahanti, 2014). Building teacher capacity to experiment and innovate involves mindsets and beliefs (Achistein, 2002). Hargreaves (1997) and Beattie (1997) relate this process as enculturating teachers’ roles towards adaptive experts. The process is important because “of all school variables… it is teachers who have the greatest effect on student learning outcomes” (Lingard, 2004, p.174).

Towards a socio-cultural stance of teacher learning

Most teacher learning persist a cognitivist stance assuming knowledge is packaged and delivered, not the experience of learning. Competency acquisition is separated from practice (Webster-Wright, 2009). This stance has inadequacies: 1) it de-emphasizes tacit knowledge; 2) assumes knowledge acquired is applied in practice; and 3) does not acknowledge that knowledge is distributed across the community (Kelly, 2006; Webster-Wright, 2009). These attempts at teacher learning focus on expertise in a content area and not adaptive expertise about teaching where teachers engage in self-assessing and decision-making before, during, after teaching episodes (Soslau, 2012). Teaching is a relational and dialectical process. It involves intellectual and social collaborations between teachers and students. The practice of teaching is collective (teachers function as part of a social network) and suggests implications on how teachers learn adaptive expertise (Leu & Price-Rom, 2006).
Despite different pathways of teacher learning, there is still a theory-practice divide. Efforts seem to take a cognitive stance emphasizing theories and leaving the problem of integration and enactment to individual teachers. Consequently, teaching becomes craft-based dependent on teachers’ interpretations, and applications as they are individually able (Timperley, 2011). These efforts at most develop inert, abstract knowledge and not adaptive, situated understandings based on enactments with students in classrooms (Lampert, 2010; Soslau, 2012). “Teaching requires adaptive expertise…involves being fluent with routines in order to work efficiently and innovate when necessary, rethinking key ideas, practices, and values in order to respond to non-routine inputs” (Lampert, 2010, p.24). If teaching is relational work and the practice functions as a social network, then teacher learning employing cognitive, individual stance seems less effective. Teacher learning and adaptive expertise seems more productive as a collective, community-based endeavor while teachers do their work (Lampert, 2010).

Addressing these limitations, a socio-cultural stance sees teacher, context, and learning as interrelating. Teacher learning is about creating experiences and opportunities to engage teachers in co-constructing knowledge and new practices in context. It is about learning by teachers as they relate to individual and collective situations (Nelsen & Slavit, 2008; King 2001). At the individual level, teachers become thoughtful of their practices. At the collective level, teachers collectively confront issues and critically examine issues to reach shared understandings (King, 2001).

dialectical between the individual and group forming the socio-cultural context (Borko, 2004). In essence, teacher learning from a socio-cultural stance is about creating learning opportunities where teachers engage collectively in critiquing and making informed decisions about their practices to develop higher levels of adaptivity (Timperley, 2011).

This perspective of teacher learning is connected to socio-cultural theories like Dewey, Vygotsky, Lave and Wenger, and Kolb. Dewey (1927, 1933) conceives learning as holistic -- the learner is within the learning process. Vygotsky (1979) stresses that expert teachers scaffold peers. Lave and Wenger (1991) introduce “communities of practice” describing how knowledge is distributed and constructed through interactions. Kolb (1984) highlights the cyclic process of experience, observation, applying, and testing knowledge. The themes central to socio-cultural theories are learning is a) situated in physical and social contexts; b) social in nature; and c) distributed across the individual, social others, and tools (Putnam and Borko, 2000).

Research provides understandings about benefits and characteristics of situated teacher learning and adaptive expertise. However it lacks insights about the dimensions and strategies for creating a collective environment that enables the learning of teacher adaptivity (Webster-Wright, 2009). Teacher learning is a social process. It is important to create the socio-cultural conditions to re-structure and re-culture the process of teacher learning towards collective efforts of adaptivity (Putnam & Borko, 2000; Timperley, 2011). These enablers create the environment for teachers to collectively learn adaptivity but few scholars have described opportunities of developing teachers’ adaptive capacities in real-life contexts (Soslau, 2012).

The social situations of classrooms and schools are powerful contexts for professional learning (Putnam & Borko, 2000). Communities enable collaborative inquiry as teachers
construct understandings through interactions, negotiations, and co-operations in ongoing professional work (Dumont, Istance, & Benavides, 2010; Nelsen & Slavit, 2008). School leadership and time facilitate productive dialogue so teachers develop trust and norms to critically analyze issues (Borko, 2004). Communities are a means for teachers to develop adaptivity through collaborative effort and joint problem solving. Communities create spaces where efficiency of teacher learning and innovations are at play. Teachers develop adaptive expertise by getting feedback and learning from practitioners. Schools that value professional learning make teacher learning and adaptivity a core business. They promote interactions and encourage teachers to connect with communities beyond the school so new ideas are consistently drawn to challenge learning (Dumont, Istance, & Benavides, 2010; Leu & Price-Rom, 2006; Timperley, 2011).

The literature review so far suggests links between teacher learning and school’s provisions of socio-cultural supports (such as communities and leadership) for teachers to become adaptive experts. If teaching is relational work and the practice functions as a community, there are implications on teachers’ learning of adaptivity (Leu & Price-Rom, 2006). This suggests that socio-cultural principles of teacher learning cannot be implemented without considering local, school contexts and stakeholders (Timperley, 2011). The literature review also leads us to posit that adaptivity is beyond one’s disposition for experimentation, but the interplay between the individual’s (e.g. teachers) learning journey and wider culture (e.g. school culture and context) supporting curricular innovations. Dialectics between individual and culture is described as the identity-forming process (Lichtenstein et al., 2006), which explains the development of teacher adaptivity. Teachers need to be collectively supported where school leaders create socio-cultural structures and processes that enable schools become sites for teacher learning. It is about developing organizational capacity, as teachers learn and grow its collective adaptive capacity. Successful teacher learning requires
interdependent partnerships and for teacher adaptivity to be supported by the wider education system so learning ripples and sustains across multiple layers (Nelsen & Slavit, 2008; Timperley, 2011). This paper describes the case study of one school and investigates the socio-cultural enablers mediated by curricular innovations for developing teacher adaptivity.

**Research Context**

There are commitments to education research as Singapore tries to balance or hybridize teacher-centered and 21st century pedagogies (Hogan, 2014). The Ministry of Education (MOE) gives the mandate for research to the Office of Education Research (OER), National Institute of Education (NIE). One area is school practice and change; studying innovation diffusion and how innovations mediate capacity building and transform practices.

History and socio-cultural context shape teaching and learning. One challenge is changing the deep-rooted examination mindset. Teachers have difficulty not “teaching to the test” (Hogan et al., 2013; Hogan, 2014). Based on Singapore’s success in international studies, such as PISA (Teh, 2014), our conjecture is that teachers have mastered the routine of drill and practice and less on 21st century pedagogies.

Aligning with situated teacher learning (Borko, 2004; Kelly 2006; Webster-Wright, 2009), an embodied experience helps teachers discover how to balance, and hybridize pedagogies to enable students’ grades and develop their criticalities in thinking. The following paragraphs describe the school context and methodology to help scholars understand the extent findings are applicable to other situations. In this qualitative research, transferability is exercised where “it is not up to the researcher to speculate how…findings can be applied…it is up to the consumer of the research” (Merriam, 1995, p. 51).

This study occurred in a primary School X. School X is a high performing school that nurtures academic excellence and values. This is evident in the oversubscription of students
for primary 1 and the prominent displays of achievements in games, sports, arts, and academics. Over the last 7 years, School X leveraged the education fraternity to create opportunities for curricular innovations. It engaged partnerships with NIE researchers to initiate curricular innovations as a way to develop capacity and a teacher learning culture.

The principal emphasized that teachers need adaptivity so that they could help students do well for examinations, and also adapt to the 21st century learning landscape. Through curricular innovations, School X created authentic opportunities for teachers to develop adaptivity. Teachers developed skills to engage in didactic and constructivist approaches depending on instructional goals. The partnerships enabled School X to be a centre of excellence that mentors other schools and teachers to facilitate the learning and spreading of adaptivity.

**Methodology**

This is a single-case study framed using interpretative phenomenological analysis (IPA) (such as Flyvbjerg, 2006; Smith & Eatough, 2007; Yin, 2003). The objective is to unpack socio-cultural enablers mediated by curricular innovations that shape teachers’ learning of adaptivity. IPA aligns with the study’s socio-cultural stance as it enables detailed exploration to understand teachers’ lived experiences in curricular innovations. IPA allows understanding events, processes and meanings that teachers construct from curricular innovations in a nationalistic way. Researchers play active and dynamic roles, engaging in sustained inquiry and making sense of teachers’ experiences. Researchers consider the context and his / her conceptions to develop nuanced understandings of enablers, supported by data such as excerpts from interviews, that shape teachers’ adaptivity and 21st century learning practices in schools (Denzin, 2009; Denzin, Lincoln, & Giardina, 2006; Smith & Eatough, 2007; Thomas, 2011).
Sample

Systematic, non-probabilistic sampling was employed. Informants were not selected to establish a representative sample but to enable in-depth exploration of the phenomenon (Mays & Pope, 1995; Morse, Barrett, Mayan, Olson, & Spiers, 2002). Participants were selected based on their participation in curricular innovations. Participants included leaders (for example, district superintendent, school principal, vice principal, heads of departments, and subject heads) who provided leadership in creating enablers that facilitated the innovation and teachers involved in designing and implementing the curricular innovation. Principles of sampling adequacy was upheld to ensure data was obtained from multiple stakeholders and saturation was achieved (Morse, Barrett, Mayan, Olson, & Spiers, 2002)

Data Collection and Analysis

Data collection lasted for one year. Multiple sources (such as field notes, interviews, and observations of classrooms, meetings and learning communities) were gathered, to establish a chain of evidence. These sources enabled triangulation and patterns of convergence to ensure rigor (Mays & Pope, 1995; Whittemore, Chase, & Mandle, 2001). Table 1 shows how data sources contribute to the study.
Table 1. Data sources and its contribution to the study.

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Data Obtained</th>
<th>Contribution to Research Question</th>
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<tbody>
<tr>
<td>Field notes</td>
<td>• Descriptive information about the socio-cultural enablers the school created, teachers’ classroom practices and discussions in communities&lt;br&gt;• Reflective information about researchers’ hunches and areas for clarification</td>
<td>• Provide an audit trail of details about data collection and analyses.&lt;br&gt;• Identify areas needing further inquiry and clarifications from stakeholders</td>
</tr>
<tr>
<td>Observations</td>
<td>• Insights about leaders’ and teachers’ practices and interactions in naturalist settings</td>
<td>• Enable nuanced understandings by helping researchers see things that participants may not be aware of,&lt;br&gt;• Validate what participants say in interviews align with what they do in reality.</td>
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<tr>
<td>Interviews</td>
<td>• Capture different stakeholders’ views and experiences about the socio-cultural enablers and how they help teachers develop adaptivity</td>
<td>• Probe deeply into different stakeholders’ views.&lt;br&gt;• Interviews and observations co-inform as data from interviews are fitted into contextual insights gained from observations.</td>
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Twelve interviews were conducted with district superintendent, school principal, vice-principal, heads of departments, subject heads, and teachers involved in innovations. Once off interviews were conducted with participants, throughout the course of the research, based on their availability. The goal of these interviews was to capture different stakeholders’ views and experiences about the socio-cultural enablers and how they helped teachers developed adaptivity. These interviews contributed to the research question by probing deeply into different stakeholders’ views about the intentions of structures, practices, and their socio-cultural affordances for developing teacher adaptivity. Interviews were guided by open-ended questions about enablers, structures and processes that facilitated teachers’ adaptivity and transformed the school’s culture and practices. Written informed consent was obtained prior
to data collection. Each interview lasted about ninety minutes and was digitally recorded and transcribed verbatim. Member checking was done to ensure credibility of transcriptions.

Three kinds of observations were made throughout the study. Observations were captured in classrooms to document teachers’ innovative practices and the school’s learning culture. Other observations were captured during leaders’ meetings with teachers to get buy-in and communicate the innovations’ strategic directions. Observations were also captured when teachers met as a learning community to understand the kinds of interactions between teachers and adaptations created to make the innovation relevant for different school contexts. The three kinds of observations occurred fortnightly throughout the duration of the study. Each type of observation lasted approximately 60 to 90 minutes long. All observations were video recorded and analysed.

The observations provided insights about leaders’ and teachers’ practices and interactions in naturalist settings, such as principal’s communications about the vision for introducing innovations, how teachers interacted with students and the kinds of adaptations teachers made as they enacted innovations. These observations contributed to the research question by enabling nuanced understandings and helping researchers see incidents that participants may not be aware of, such as the unique affordances of certain structures and processes for teacher adaptivity. It also enabled researchers to validate what participants said in interviews aligned with what they did in reality. Interviews and observations co-inform each other because data from interviews were fitted into contextual insights gained from observations.

Field notes were made during observations and throughout the research process. The field notes from observations provided descriptive information about the socio-cultural enablers the school created, teachers’ classroom practices and discussions in learning communities as they implemented innovations and adapted their practices. Field notes
throughout the research process included reflective information about researchers’ hunches, impressions, analyses and areas for clarifications throughout the study. The field notes served to provide an audit trail of details related to data collection and analyses. It enabled researchers to identify areas needing further inquiry and clarifications from participants, such as the affordances of socio-cultural enablers and how these shaped teacher adaptivity.

Principles of IPA guided data analyses. The analyses and interpretation process involved toggling between macro and micro perspectives. Micro perspectives were events that teachers experienced during curricular innovations. These events enabled a macro view to be weaved and also created nuanced understandings of socio-cultural dimensions for developing teacher adaptivity. Researchers’ reflectivity in the form of memos shaped data analyses. The analytic stages involved: 1) iterative, detailed readings of teachers’ accounts to get holistic understandings and researchers’ initial reflections; 2) identifying initial themes and organising into clusters; 3) refining and condensing themes -- making connections within or across themes; and 4) emerging nuanced understandings of teachers’ adaptivity and how 21st century learning practices evolved (Smith & Eatough, 2007). Peer examination was employed to ensure plausibility of interpretations. Researchers involved have relevant background, as they work on other projects that investigate how curricular innovations spread in schools and the affordances it provides to enable teacher learning and changed practices.

**Findings**

Data analyses uncover four themes that describe the socio-cultural enablers, including processes and structures, for developing teachers’ adaptivity within the school. The themes are: 1) school leadership creates the socio-technological provisions for teacher experimentation and innovation; 2) learning contexts that re-orientates pedagogy, curriculum, and assessment; 3) learning communities for building teacher capacity; and 4) historicity for developing adaptivity. These themes will be discussed in the subsequent sub-sections.
School Leadership Creates Socio-Technological Provisions for Teacher Experimentation and Innovation

Persuading teachers to innovate

School leadership is critical for implementing student-centered, curricular innovations. In the excerpt below, Principal Tim articulates his vision for 21st century learning during a meeting with teachers. Twenty-first century learning practices should not be an add-on to teacher-centered practices. It is important to re-design curriculum. Technology provides opportunities for evolving practices.

**Principal Tim:** …the goal is to develop students’ 21st century skills… technology provides an opportunity to achieve this. There is a need to look into re-designing the curriculum. It is not a simple substitution or replacement exercise to develop 21st century skills... It requires restructuring curriculum and a change in learning environments. *(Excerpt from observation)*

**Teacher Min:** “[Principal Tim] shares with me his idea, his vision … I think as a Principal he actually gets his subordinates to buy in... I also learn that in order for me to get my teacher to buy in, to believe in this, I need to convince my teacher. But in order to convince my teacher, somebody needs to convince me and that is [Principal Tim].” *(Interview excerpt)*

Through his vision, it may be observed that Principal Tim attempts to persuade teachers to begin *experimenting* pedagogies. The vision attempts to garner teachers’ buy-in that everyone is embarking on this innovation journey collectively. The vision suggests that socio-cultural enablers will be created to help teachers transform practices and develop teachers’ adaptivity.

*Cultivating deep pedagogical understandings for distributed leadership*

Principal Tim emphasizes the criticality of teachers and professional development in developing 21st century practices. He stresses the tensions of innovating and ensuring academic performances.


**Principal Tim:** “…You need teachers with the competency to deliver the new curriculum. You need structures to support professional development… to create a sustaining culture where teachers are comfortable with experimenting, reviewing and learning [in collaborative settings]…

“professional development builds culture. It makes teachers understand that what (the new learning designs) they are doing is not just experimenting... Teachers need to understand that (it is) experimenting with boundaries... Teachers need to change the ways they teach and yet meet curriculum objectives...” *(Interview excerpt)*

This leads us to infer that Principal Tim recognizes professional development as a culture building process that creates common understandings and conversations around new learning designs. Teachers may work in communities to develop *deep pedagogical understandings*, initiate innovations, and develop adaptivity. *Communities with pedagogical underpinnings* may be socio-cultural enablers because it allows Principal Tim distribute leadership where teachers lead curricular innovations and ensure curriculum objectives are met. The following excerpt indicates how a teacher has grown as a result of using curriculum innovations as a means of professional development.

**Teacher Lynn:** “…[the curriculum innovation] definitely helps me a lot. I mean this is my first primary school... So my exposure is completely not [the same]…what I was exposed to [in this school] is completely not what my experience had given me before. Definitely now with the new 21st century [innovation], with all the talk about SDL [self-directed learning] and COL [collaborative learning], I am able truly able to see how it manifest in a classroom...” *(Interview excerpt)*

*Networking with stakeholders to alleviate pressures of innovation*

Principal Tim recognizes that resources are fundamental in implementing innovation plans. The excerpt below shows how he helped teachers focus on good learning designs by allocating resources from multiple agencies. He *networked with stakeholders*, for example industry partners, to bring in resources, such as portable devices. He encouraged researchers partner teachers to implement innovations that focus on academics and 21st competencies.
Principal Tim: “…it is important to leverage the community to rethink strategies in using technology for teaching and learning… I tried to bring in resources to support the school….I managed to get NIE to support us… I recognized the road ahead is going to be long… we need a lot of support and expertise to help the school, such as buying equipment…[I] started to source for funding and partnerships to kick start experimentations and to purchase equipment.” (Field notes from principals’ meeting with teachers)

These networking efforts may be interpreted as Principal Tim’s way of creating socio-cultural leverages for innovations. The following interview excerpt from a teacher shows how he alleviated teachers’ pressures by getting researchers’ support to redesign curriculum. These efforts seemed to create a multi-stakeholder community that supported teachers in innovations and developing adaptivity.

Teacher Jane: “…NIE researchers played a key role in hand holding us (teachers) though these learning designs. They worked closely with teachers to co-design lesson plans and learning activities. They observed teachers as they enacted the lessons and provided timely feedback to improve lesson plans and address issues…” (Interview excerpt)

Learning Contexts that Re-orientates Pedagogy, Curriculum, and Assessment

Continuous reorienting process with researchers’ support

Curriculum reform is an arduous journey. Common in 21st century learning interventions is creating learning contexts that re-orientates pedagogy, curriculum and assessment. Teacher Janice explains to colleagues in a learning community that their role is to redesign lessons adopting both classroom learning and outside classroom experiences. Mobile devices and other multi-media capturing devices facilitate authentic learning. These efforts may promote students’ articulation, for example collaborative learning facilitates collective knowledge constructions and individual understandings.

Teacher Janice: “… In our learning designs, the focus is on inquiry-based learning, how we can get students to question more, share their ideas, and leverage on their own experiences... Although we want to focus on the pedagogy, mobile devices excite them (students). Students can Google in class when they have a question. They can capture out of classroom experiences in videos or photographs and share it in class…” (Observations of teachers’ interactions in a learning community)
Our conjecture is that researchers are socio-cultural enablers that provide expertise to help teachers work iteratively in redesigning learning contexts until satisfactory learning outcomes are reached. For example, researchers mentor teachers to design opportunities for students to construct knowledge. Researchers guide teachers through design-based research methodologies, help teachers enact, and provide feedback to refine student-centered learning designs.

**Teacher Irene:** “…together with researchers… teachers come up with this project whereby [teachers] will execute in the classroom and then of course the researchers will help with all the research findings…researchers went in to do the videotaping [and then reflect and refine the lesson with teachers]” *(interview excerpt)*

*Embodyed learning experiences for teachers*

More importantly, the following interview transcript shows how teachers, such as Jane and Janice, through the collaborative process of designing, enacting, and refining lesson packages with colleagues and researchers develop *embodied insights* of students’ learning, and changes that teachers are capable of.

**Teacher Jane:** “…Before I got myself into this project, I was also very half-hearted because …I have been teaching Primary 6, very focused exam oriented, results oriented… So when it comes to [the curricular innovation]…I was not totally convinced but results showed that they [students] improved… the pupils’ responded not only in terms of examination; also in terms of vocal. They were able to express themselves…” *(interview excerpt)*

**Teacher Janice:** “…[when enacting the new learning packing] the classroom environment is different…it is noisy. My students are asking questions, they are discussing and showing me things with their phones… My role as teacher changes …I can say I don’t know and encourage students to find out…” *(interview excerpt)*

Our conjecture is that the process of redesigning learning packages creates opportunities for teachers to dialogue, design and implement learning packages for 21st century learning. Our observations of teachers’ practices and enactment of innovations in classrooms show that teachers tried to elicit students’ understandings by getting students to ask questions, explain their thinking, and share solutions. These observations suggest that
these experiences enable teachers to understand how 21st century learning can be translated to classrooms. The positive efficacies experienced may encourage teachers to infuse inquiry practices with teacher-centered pedagogies. The iterative process of reflecting and refining as a community with researchers’ support seems to encourage teachers to address challenges faced in innovations and to foster teachers’ learning of adaptivity.

Learning Communities for Building Capacity

Within school learning communities sustain a culture of learning

Fundamental to adaptivity seems to be leveraging the socio-cultural affordances of communities to build teachers’ capacities of teaching for examinations and the ‘new innovative pedagogies’. The following interview transcript describes School X’s community activities for capacity building.

**Teacher Jane:** “…we have Time Table Time (TTT) where we meet the teachers every week to discuss about the lesson plan, the worksheets, anything to do with that level... *(Interview excerpt)*

**Teacher Joe:** “…Every week, we have timetabled time. We co-design lesson plans. We think about the kinds of learning activities and objectives for different students (low, middle, and high ability students)… We discuss how we are going to conduct lessons for the week. We share with colleagues the problems we face and make improvements for next year’s lesson plans…” *(Interview excerpt)*

**Teacher Amy:** “But there is a system in place to bring in these teachers who are not so ready yet like our regular TTT session. Every week we get the teachers, different teachers to share. So different teachers when they share, then another teacher will say oh you did this way. So although it’s the same lesson plan but the teachers carry out differently. Why? Because their students are different. So through the sharing, the teachers feel that maybe I should try this one the next time round. So it sort of encourages them to try…” *(Interview excerpt)*

The above excerpts together with our observations of teachers’ interactions in meetings and learning communities show that School X has a history of continual dialogue, during which teachers collaboratively refined learning objectives, teaching materials, and assessment. In these observations, we discovered that because teachers involved were given time off to meet as a community. They fully leveraged the opportunity to openly discuss
about teaching and learning issues. They focused their efforts on coming together to redesign
the curriculum and contribute to various parts of the lesson package. The lesson package
acted as a shared artefact that congregated all experiences of implementation and stories
about adaptations made in classrooms. The common goal was to improve and fine-tune the
lesson package, thus, teachers were open to sharing successes and failures. The leader was
also instrumental in fostering trust by openly sharing, often being the first, to contribute to
discussions about any issues and problems she experienced.

After teachers implemented their planned designs, they returned to learning communities
for reflections. It can, thus, be interpreted that, School X adopts a capacity building model
consistent to learning communities (Wenger, 1998a). Learning communities take ownership
of helping teachers develop adaptivity. The socio-cultural dimensions afforded by the
community are:

1) open dialogues about teaching and learning issues;

2) sharing artefacts and stories about teaching; and

3) fostering trust by not only sharing successful experiences but also failures in
implementation.

These dimensions seem to give teachers courage to redesign pedagogy and help teachers
develop adaptivity.

Developing across school communities to spread adaptivity

To continue developing teachers’ professional practice, School X invited other
teachers in the district to observe and be mentored by its teachers. Figure 1, from a classroom
observation, shows how other teachers are invited to witness classrooms and student-centred
learning designs implemented in School X.
School X’s principal, with the district superintendent’s support, develops a partnership program to mentor partner schools. The district superintendent’s interview transcript describes his role in this endeavour:

**Sup Mike:** “…My involvement signals the importance I place in this effort … Together with the principals from all the 6 schools involved, we steer and monitor the curricular innovation efforts … we want to encourage all our teachers who are undergoing the change process to take the journey in good stead …” *(Interview excerpt)*

In a way, it can be interpreted that a socio-cultural structure and process for spreading teachers’ adaptivity is created for partner schools. The *across school community* provided peer support and mentorship for partner school teachers as they designed and enacted curricular innovations collectively. Teachers from School X who had more experience with the innovations were paired with partner schoolteachers and ‘hand-holding’ was provided. The interview transcript below shows how the across schools learning community enables capacity building for spreading teachers’ adaptivity.

**Vice principal Liz:** “when we first started, it could have been easy for us to just deliver the 5 schools with our package. “Like I will throw this to you, this is my Science package, and all of you can do the same thing” but we didn’t choose to do this right from the start. Because the rationale was to teach them [teachers] how to get their hands dirty and how to redesign the whole package altogether … when it came down to such things like the actual lesson… we share our best practices in other areas with these 5 schools about our challenges with teachers, our journey with teachers, convincing them …how has our teachers’ mind-sets and their skills and classroom change.” *(Interview excerpt)*
Our observation is that School X recognized the importance of diffusing and sustaining innovative practices. Thus, a teacher-learning structure that capitalizes the across schools community to benefit his school and vice versa is implemented. The structure affords socio-cultural dimensions because it involves teachers from partner schools learning from each other and cross-fertilizing ideas.

**Historicity for Developing Adaptivity**

*Continuing dialogue with colleagues*

Teachers in School X elaborated in the interview excerpt below that the essence of curriculum reform is engaging teachers in a *dialogic process of experimenting*.

**Teacher Eric**: “…We had dialogue sessions with teachers to explain to them what the innovation was about… in like 1 or 2 sessions… it was not detailed... It was a one off thing and then after that we again threw [the innovation] to the teachers to try it out. And then teachers commented that the dialogue needed to be continuous... They were sharing with us how they were not able to carry out the lesson plans, why they were not able to do so, what are the things that needed to be address… When they tried out with other classes...they also began to surface what kinds of customizations were needed to meet pupils’ needs at the various levels (low ability, middle ability, and high ability) students…” *(Interview excerpt)*

Continuous dialogues, observed in the regular interactions in meetings and learning communities, may be interpreted as a socio-cultural leverage for innovations and teacher adaptivity because it enables discussions with colleagues for idea creation, reflections, and identifying refinement areas to meet students’ needs.

**Allowing sufficient time for adaptivity**

Our observations of teachers’ interactions in meetings and learning communities coupled with interviews suggest that *historicity and trajectory of innovations* provide diverse learning experiences for teachers, and subsequent collective sharing reinforces teachers’ adaptivity. In these observations, we noticed that, over time, as teachers continued their
discussions and the innovations became more pervasive in the school, teachers accumulated a collection of implementation experiences and stories of adaptations that happened in classrooms. This repertoire of experiences and stories were repeatedly referred to where teachers critiqued and asked themselves how they could further refine their lesson packages to enrich students’ learning experiences.

The excerpts below show that the culture of innovation and teachers’ learning of adaptivity is built through historical evolutions. Time is needed for innovations and communities to grow so teachers have more examples to study and appropriate from to develop adaptivity.

**Teacher Amy**: “…the innovation was first being introduced to one pilot class [middle ability]… the teacher worked with the support of subject level head, HoD [head of department] and researchers to come up with the lessons plans…In the following year … We wanted to roll out to the entire cohort of Primary 3 students… we realized that there were a lot of issues and we did not have sufficient resources…enacting in 1-2 classes and to the cohort was different…totally different ball game… We took a break of 1 year. This was a significant period for reflection. It gave the school time to redesign the curriculum, iron out issues, and develop teacher capacity before enacting it with the whole cohort….After this break… the school was ready to roll out to the whole cohort in Primary 3…and later to the whole of Primary 3 and 4 in the following year…” *(Interview excerpt)*

**Teacher Jane**: “In 2009 it was a pilot class ... when it was being rolled out in 2010, we had a lot of issues… In 2010 we did plan but somehow the issues are even bigger than what we expected…when it [the innovation] was being rolled out to 8 classes….in 1 class we can easily get buy in but then when you get different classes of pupils into this project together with the parents, together with low ability pupils then it’s a total different thing…. In 2011 there was a break to really plan and think through all these issues. In 2012 the innovation was rolled out to Primary 3.” *(interview excerpt)*

**Discussion**

**Socio-cultural Dimensions for Teacher Adaptivity within Schools**

Revisiting adaptive expertise as an individual construct (Koh, Hong, & Seah, 2014) and appropriating it to a socio-cultural level, we believe an education system would benefit from new cultures of learning (Hung, Lee, & Lim, 2014; Hung et al., 2014). Rather than taking a cognitive stance of teacher learning, our premise is for teachers to develop adaptivity
from a situated, socio-cultural perspective. Teacher adaptivity is about being flexible to didactic and inquiry approaches according to intended learning goals. Since teaching is relational work and the practice functions as a community, the socio-cultural enablers that facilitate teacher adaptivity may not be useful without considering local, school contexts and stakeholders (Leu & Price-Rom, 2006; Timperley, 2011). This study attempts to illustrate how School X used curriculum innovations as a way of creating socio-cultural supports to enable teacher learning and adaptive expertise as a collective, community-based endeavor.

Research provides understandings about benefits and characteristics of situated teacher learning. However, dimensions and strategies supporting situated teacher learning appear limited (Webster-Wright, 2009). Few scholars have described opportunities of developing teachers’ adaptive capacities in real-life contexts (Soslau, 2012). Our findings addresses this gap by illustrating how socio-cultural enablers mediated by curricular innovations creates a collective learning environment that shapes teachers’ adaptivity in School X. The four socio-cultural enablers revolve around: 1) school leadership creating the socio-technological provisions for teacher experimentation and innovation; 2) learning contexts that re-orientates pedagogy, curriculum, and assessment; 3) learning communities that build teacher capacity; and 4) historicity for developing adaptivity.

Our case study shows how socio-cultural enablers for teacher adaptivity manifest in a real-life context. The strands of support are complex and interrelating from school leader, community, researchers, external stakeholders, across schools, and district levels. This demonstrates how teacher adaptivity develops in a socio-cultural manner, involving individual teachers and the wider, social context. School X’s vision for 21st century learning affords socio-cultural dimensions. It helps teachers understand that everyone is jointly involved in the innovation journey. Although communities are intuitive socio-cultural environments for situated learning (Borko, 2004; Darling-Hammond, 2000; Webster-Wright,
2009), communities in our case study extend beyond School X. The communities include researchers and across school teachers where they collectively develop adaptive expertise by creating common understandings and developing disciplinary knowledge to lead innovations.

Other researchers (e.g. Achistein, 2002; Beattie 1997; Hargreaves, 1997; Hollins et al. 2004; Zhao & Kuh, 2004) also acknowledge communities’ role in changing teachers’ beliefs and enculturating teachers towards adaptivity. Our findings show that communities do not only afford the socio-cultural supports for inquiry and teacher adaptivity with peers. It is also about developing teachers to influence and impact adaptivity within schools and beyond. Teachers from School X are given the role of mentor teachers to develop teachers from other schools.

In this study, we realized that extended time and deliberate opportunities that challenge teachers’ practices must be planned in communities to develop teacher adaptivity. These opportunities may arise by introducing different stakeholders (such as teachers from other subjects, across schools, and researchers) to trigger new ways of thinking so teachers are not entrenched in existing norms. These opportunities enable teachers to not only develop adaptive expertise for their individual practices but also develop the collective adaptive capacity of the community and school. The deliberate designing of such opportunities involves school leaders and steering communities to monitor resources and chart directions for teacher adaptivity. It also allows school leaders to understand how to create socio-cultural enablers and the interweaving of multiple strands of support to create an environment that develops teacher adaptivity.

Sustaining teacher learning and changed practices requires teachers take leadership of professional development (Mujis & Harris, 2003). Developing teachers’ disposition to mentor and innovate are foundations for school-wide culture (Mulford, 2003). This study
suggests that communities afford socio-cultural dimensions, such as collaborations, sharing artifacts, and stories, so teachers develop deeper understandings of adaptivity with peers; situated in on-going practices. Developing teacher adaptivity in social, community settings allow teachers take ownership of professional learning so they become leaders or champions of adaptivity. This is an important consideration. It facilitates sustainability and impact of teacher adaptivity because professional learning is done by teachers and with other teachers in practice.

**Developing Teacher Adaptivity across Schools**

Jackson and Temperley (2007) suggest creating networked learning communities to expand fields of knowledge. Teachers from other schools can inject diversity, and model different pedagogies to facilitate change (Muijs, West, & Ainscow, 2010). Having strict school-based boundaries may lead to homogeneity and limit teacher adaptivity. Rather flexible boundaries are encouraged so teachers consistently manage conflicts and create new synergies. This process reenergizes learning and enables teachers develop different understandings of teacher adaptivity.

Besides injecting diversity into learning communities, across school communities play a different role in this study. By involving other teachers beyond immediate school boundaries, School X tries to enforce the sustainability and impact of teacher learning. The kinds of socio-cultural enablers and communities from within school, across schools or at district levels may shape the impact of teacher adaptivity and enable it to ripple across layers in the wider education landscape.

Organizing socio-cultural enablers for developing teacher adaptivity involves time, resources, and knowledgeable champions, including teachers, school leaders and researchers. The key is to learn from one school’s experience, such as our case study, and facilitate the
development of teacher adaptivity to spread to other schools. Each school is unique and every school’s leadership and socio-cultural dimensions are unique. While we desire diffusion and spreading of teacher adaptivity, we are cognizant of localized difficulties (Toh et al, 2014). The sensitivities of each local context and their socio-cultural dimensions are imperative to teacher learning and developing adaptivity.

Our findings suggest that it may be insufficient to rely on policy enactments alone but on school leadership to deliberately plan and create socio-cultural enablers and strategies for teacher adaptivity. The belief of teachers as adaptive experts is something that policies cannot enforce. In this study, we demonstrate the kinds of socio-cultural enablers that a school has created to make teacher learning a core business while considering the sustainability and impact of teacher adaptivity within and across schools. For example, a strategy could be for school leaders to set a clear vision that articulates how 21st century learning innovations enables the development of teacher adaptivity. The vision affords socio-cultural dimensions because it signals to teachers a need for genuine experimentation. It gives teachers a sense that structures and processes will be created to transform practices and develop teachers’ adaptivity. Multiple learning communities within and across schools are created so that there is a cyclic learning process where multiple parties consistently bringing in new ideas to examine and challenge practices.

In Singapore, developing a good cadre of school leaders enables translating policies to practice. School leaders create structures that enable their middle management and instructional-curriculum leaders to enthuse others into taking journeys of developing teacher adaptivity and cultures of learning. Our findings suggest a strategy involving multiple stakeholders, like researchers and industry partners. Networks create socio-cultural enablers by providing resources and expertise that alleviate pressures of innovation and create meaningful learning environments for teachers. For example, researchers mentor teachers in
designing innovations and providing expertise to help teachers develop deep disciplinary knowledge. These professional learning opportunities allow teachers develop capacities and leadership to initiate innovations.

Findings suggest that communities are authentic contexts for teacher learning. Interactions with others provide diverse views, collegial support, and peer mentorship so teachers develop courage and capacities to redesign pedagogy. School leaders need to create within and across school learning communities because these socio-cultural structures enable teachers take ownership of innovations and develop teacher adaptivity. Teachers need to understand the value of within and across schools communities. This is important because classroom functions have been largely isolated individual practices until more recently internationally (Ainscow, Muijs, & West, 2006; Mujis & Harris, 2003; Muijs, West, & Ainscow, 2010).

Our case study suggest that spreading teacher adaptivity is possible through a decentralized approach of diffusion in which school leaders, teachers, and students are facilitated by creating socio-cultural structures and processes across schools and not just within schools. Communities may take more active roles to connect multiple levels of the education system moving from schools, districts and system levels. Coherence and synergies are needed to re-culture, re-structure and spread teacher adaptivity. This is a shift in policy thinking towards the deliberate promotion of emergent, ground-up processes (Ainscow, Muijs, & West, 2006).

**Conclusion**

In this paper, we attempt to transpose teacher adaptivity from an individual construct to a socio-cultural one. Our case study illustrates how socio-cultural enablers mediated by curricular innovations create a school environment that develops teacher adaptivity as a
collective, community-based endeavor. The themes show how multiple strands of support interweave to create an environment where learning communities are encouraged. Learning communities facilitate the learning of teacher adaptivity from embodied experiences of actual performances, reflections, and dialogues about innovations. Consequently, teacher adaptivity develops in a socio-cultural manner, involving individual teachers and the wider, social context.

Our aim is to document the journey, which School X underwent, to understand the socio-cultural dimensions for developing teacher adaptivity so schools across Singapore may embark on their journeys of developing teacher adaptivity. This study suggests that communities do not only afford socio-cultural supports for inquiry and teacher adaptivity with peers. It is also about developing teacher leaders to influence and impact adaptivity within and beyond schools. We realized that extended time and deliberate opportunities that challenge teachers’ practices must be planned in communities to develop teacher adaptivity. These opportunities may arise by introducing multiple stakeholders to trigger new ways of thinking. The deliberate designing and monitoring of socio-cultural enablers and opportunities for learning adaptivity by school leaders is needed.

Sustaining teacher learning and changing practices also require teachers take leadership of professional development. The willingness of teachers to experiment and engage in reflective practice remains essential. These are important considerations. Cultivating learning communities may be more sustainable and effective for developing teacher adaptivity within and across schools because there is ownership of professional development. Future work can extend the social-cultural stance of teacher learning by investigating how communities in within and across school settings offer social-cultural affordances so teachers can collaborate to lead curricular innovations and develop teacher adaptivity.
Note

NTU Institutional Review Board (IRB) is established to meet the international standards and expectations in order to protect human subjects involved in research projects as well as to support the researchers and protect the standing of the institution. NTU-IRB will conduct ethical review on all research proposals involving human research participants or human biological materials. Ethics clearance was obtained from NTU-IRB ethics board for this project.
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