SUPPORTING ADJUNCT FACULTY IN STUDENT-CENTERED INSTRUCTION: 
A COMPARISON OF TWO MOBILE LEARNING 
PROFESSIONAL DEVELOPMENT APPROACHES

by
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Abstract

Evidence suggests that student-centered instruction (SCI) facilitates superior learning outcomes in terms of fostering 21st century skills among college students. However, lecture-style teaching is still widespread in many institutions of higher learning including a private tertiary institution in Singapore. Needs assessment data collected from 90 adjunct faculty confirmed the prevalence of lectures with a majority reporting awareness of various SCI strategies but not implementing them. Possible underlying factors associated with the limited adoption of SCI include mismatched teaching conception with the pedagogical underpinnings of SCI, teaching self-efficacy, and the inadequacy of the current event-based professional development (PD). To support SCI decision making, this study incorporated known features of effective PD in the mobile space to widen access to SCI-themed pedagogical content and to create an environment for meaningful collegial interactions. A mixed methods study using nonequivalent comparison group design examined the effectiveness of mobile learning PD. Teaching efficacy scores and self-reported SCI implementation did not yield statistically significant results in both groups. However, descriptive analysis and qualitative data showed evidence of progression in SCI decision-making stages through the lens of Rogers (2003) innovation-decision framework. The findings from this study revealed considerations for the design and implementation of mobile learning PD in supporting SCI adoption, particularly in the use of task-focused interactions for increasing learning engagement, prerequisite conditions to realize a developmental agenda in a mobile-based community of practice, and the need for alignment between PD and adjunct career goals.

Dissertation Adviser: Dr. Carey Borkoski
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Dedication

This dissertation is dedicated to my mother and in loving memory of my father.

Your lives are my inspiration.
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First and foremost, I would like to thank my Lord Jesus Christ – the Giver of all good things and my ever-present help. It is only by His grace that I could have this privilege to embark on and to complete this EdD journey.

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Executive Summary

In recognition of the new wave of industrialization and disruptive changes, Singapore’s Minister of Education (Higher Education and Skills), Mr. Ong Ye Kung, in his speech at the 2018 Asia-Pacific Association for International Education, alluded to the inadequacy of content-transmission teaching approaches in universities for preparing future-ready graduates,

… the [university] system must recognize the diversity of strengths and talents amongst our young, and that only a passion-driven learning process will be self-directed, lifelong, and resilient to disruption… so the old mindset of front-loading education will change, as universities learn to embrace lifelong learning as part of their mission (Singapore Ministry of Education, 2018).

Despite evidence linking student-centered instruction (SCI) to increased engagement and effective learning transfer (Blumberg, 2009; Cornelius-White, 2007), lecture-based teaching remains the default instructional approach in the undergraduate classroom (Smith & Valentine, 2012; Weimer, 2013). Similar observations were revealed in the needs assessment study conducted in 2015 in a private tertiary institution in Singapore. For the purpose of this research, the institution of interest is referred to as the Singapore Private Education Institute (SPEI).

Barriers to SCI implementation include departmental norms that favor lectures, content-heavy and assessment-focused curriculum, as well as student resistance (Bishop, Caston & King; 2014; Henderson & Dancy, 2007; Zhu & Engels, 2014). Apart from external delimiters, instructional choice is also dependent on personal factors such as teaching self-efficacy and faculty conception about teaching and learning (Hora, 2012; Postareff, Lindblom-Ylänne & Nevgi, 2007). Research on teacher professional development (PD) emphasizes the value of situated learning and meaningful academic socialization in supporting instructional change (Bickerstaff & Cormier, 2015; Kensington-Miller, Sneddon & Yoon, 2013; Korthagen, 2016).
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Given the majority of the curriculum in SPEI is delivered by adjunct faculty, their multi-institutional teaching commitment and time challenge to attend PD in person restrict opportunities for embedded practice associated with SCI within a socially supportive environment (Kezar, 2013). In this regard, I proposed the implementation of a mobile learning approach to PD anchored on Wenger’s (1998, 2010) community of practice (CoP) principles to facilitate on-demand access to contextually relevant pedagogically resources as well as engender mutual interest and encouragement towards SCI.

Underpinning Theories

The development of the intervention is informed by literature on CoPs and mobile learning. Community-based interactions that embrace the tenets of sociocultural and socio-cognitive learning perspectives have been shown to support transition from teacher-directed to student-centered teaching conception (Kember, 2008, McKenna, Johnson, Yoder, Guerra & Pimmel, 2016) and to strengthen teaching self-efficacy, respectively (Bandura, 1997). Using Wenger’s (2010) successive participation levels in the community (i.e., peripheral, inbound, & insider) and Preece and Shneiderman's (2009) Reader-to-Leader framework that maps CoP participation levels into online sociability dimensions such as page views and posting frequencies, the support for SCI transition was provided through self-paced mobile learning in the form of micro courses and a mobile-based community of practice (mCoP). The micro courses were hosted in SPEI proprietary mobile application named STELLAR, while the enterprise version of the Facebook social software, known as Workplace, housed the mCoP.

To effectively leverage the affordances of mobile technology, the instructional design of the micro courses and mCoP followed the task model approach to mobile learning (Taylor, Sharples, O’Malley, Vavoula & Waycott, 2006). The task model presents the idea that learners move across the technological and semiotic space when engaging in mobile learning. Learning
tasks embedded with opportunities for learners to seamlessly interact with both the virtual and physical or social environments promote situated learning, offer greater learner autonomy, and facilitate multiway learner-learner as well as learner-content engagement. Taylor et al. (2006) associate these outcomes with three influencing factors of the task model, namely - context, control, and communication. Studies involving teacher participants in Facebook groups highlighted motivation for online learning characterized by frequent information retrieval and knowledge contribution (Ranieri, Manca, & Fini, 2012). Mobile learning activities optimized along these three influencing factors were also associated with extended task engagement, critical reflection, and knowledge construction (Kearney & Maher, 2013; Lan, Tsai, Yang & Hung, 2012).

Drawing upon the combined pedagogical benefits of CoP and mobile learning, this study aimed to understand the adjuncts’ transition from lecture-mode delivery to SCI through STELLAR and Workplace. I adopted Rogers’ (2003) innovation-decision model as an interpretative framework to trace the adjuncts’ knowledge, attitude, and self-reported implementation of SCI, given the model’s established research applications in higher education (Doyle, Garrett & Currie, 2013; Lund & Stains, 2015; McKenna, Johnson, Yoder, Guerra & Pimmel, 2016).

**Evaluating the Intervention**

The mobile learning PD took place from November 2017 to February 2018. Adjuncts were invited to self-select into either the comparison or treatment group depending on their learning preferences. Twenty-four comparison group participants went through self-paced learning of six SCI micro courses in STELLAR, while 25 treatment group members participated in both STELLAR and the mCoP in Workplace. The evaluation of the intervention was guided by the following three research questions:
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- How has the implementation of the mCoP achieved program fidelity?
- How does participation in mobile learning PD influence adjunct faculty progression in Rogers (2003) innovation-decision stages with respect to implementing SCI?
- What are the participants’ experiences with and without the mCoP?

The fidelity of implementation and participants’ experience were examined through focus groups and weekly mobile learning analytics, while data for the innovation-decision process were collected through the pre- and post-intervention surveys.

**Intervention Findings**

Analysis of focus group transcripts revealed that the design of the intervention adhered to the Taylor et al.’s (2006) task model approach. More members in the treatment group perceived the context-sensitivity of the learning interactions, reported having full learner control, and took advantage of the multiple communicative options. Participant responsiveness data derived from the weekly mCoP chat interaction reflected some evidence of Wenger’s learning trajectory, although treatment group members displayed varying levels of advancement from peripheral to inbound membership. An examination of the mCoP participation pattern in the longer term is likely to generate a clearer picture.

With respect to the innovation-decision process, stable scores between pre- and post-intervention suggested that the eight-week mobile learning PD, either in the form of self-paced learning with micro courses only, or having both micro courses and mCoP, may be inadequate to support instructional shift from lecture to SCI practice. However, during focus group discussions, comparison group members reported having a clarified understanding and developed favorable attitudes for SCI practices. In the case of the treatment group, advancement in innovation-decision was evident among members who interacted adequately with STELLAR micro courses and demonstrated increasing engagement levels in the mCoP.
The comparative experience of the two intervention group members revealed differences in the engagement levels with SCI micro courses. While both groups appreciated the systematic course presentation with STELLAR, treatment group participants, especially the insider and inbound members reported preferences for mCoP interactions and described their interaction with STELLAR as being less focused. Lower levels of engagement in the micro courses among active mCoP participants suggested the possibility of insufficient theoretical grounding in SCI, which might have resulted in the frequent comments on implementation problems instead of engaging in solution-focused discussion. This observation has also illuminated the varying learning preferences of adjuncts and underscored the provision of multiple mobile learning features to facilitate the appropriation of technology for PD.

**Implications**

This study represented an initial step for SPEI to provide a flexible and sustainable PD to support instructional change. Although there were no statistically significant findings, the qualitative data generated important information for the refinements of mobile learning PD and iterated the known challenges associated with higher education teaching practices. Doubts raised by adjuncts about the extent of productive learning in the distraction-prone mobile environment highlighted the need for more task-focused interactions instead of visual presentations. Adjuncts’ comments about unclear alignment between PD and adjuncts career goals also suggested the need for an integrated approach for changing classroom practice. Some recommendations included the attachment of mobile learning efforts to adjunct re-appointment and micro credentialing opportunities. Finally, knowledge about essential features of SCI and readiness to explore classroom adaptation are likely pre-requisite conditions to cultivate a developmental agenda within the mCoP. Having insider members who are committed to SCI infusion increases the probability of keeping the focus of mCoP conversations to student-oriented themes.
Chapter 1

Relying only on lecture-based teaching in the undergraduate classrooms is inadequate for the preparation of college students for the 21st century workforce (Cho, Caleon, & Kapur, 2015; Kamei, Cook, Puthucheary, & Starmer, 2012; Wismath, 2013). Although research has linked the constructivist approach to teaching, usually in the form of student-centered instructional (SCI) strategies, to increased motivation for learning, higher academic achievement, and improved problem-solving skills (e.g., Blumberg, 2009; Cornelius-White, 2007; Kuh, Kinzie, Schuh & Whitt, 2011), lecturing remains the default pedagogy in higher education teaching (Smith & Valentine, 2012; Weimer, 2013).

In the change-averse higher education environment, the growing employment of adjuncts and its associated challenges, adds another layer of complexity to the existing institutional inertia of student-centered practices (Jaeger & Eagan, 2009; Kezar, 2013; Kezar & Sam, 2013). In the U.S., almost half of the academic appointments in post-secondary, degree-granting institution is comprised of part-time faculty members (NCES, 2013). The composition of part-time adjuncts is even higher in community colleges (Jaeger & Eagan, 2009). This trend is also observed in the private education institutions in Singapore (Lim, 2009), which is the context for the present study.

Studies on the impact of adjunct faculty instruction on student learning have shown inconsistent results (Bettinger & Long, 2010; Umbach, 2007). Researchers also recognize that the unfavorable circumstances surrounding adjunct faculty employment might have resulted in inferior instructional quality (Kezar, 2013; Landrum, 2009).

Problem of Practice

In Singapore Private Education Institute (SPEI), adjunct faculty deliver over 90% of the curriculum (SPEI, 2015). With the elevated accountability and closer scrutiny on the academic
management process in Singapore’s private tertiary institutions since 2010 (Lo, 2014), SPEI has implemented several initiatives such as PD workshops and periodic lesson observations to fulfill regulatory demands for quality instruction as well as to profile a student-focused institutional brand in the rising competitive private education landscape in Singapore. However, the participation rate of adjunct faculty in PD is below expectation and transmission-based lesson delivery prevails.

Reciprocal relationships between personal characteristics of teachers and contextual factors shape an individual's decision making about PD participation and classroom practices (Bickerstaff & Cormier, 2015; Burn, Mutton & Hagger, 2010). Although there is evidence of the positive impact of PD on student outcomes in the higher education context (Postareff, Lindblom-Ylanne and Nevgi, 2007), time commitment and less emphasis on pedagogy as compared to disciplinary expertise represent some of the impediments to PD participation. In terms of SCI practices, perceived higher levels of pedagogical competence among experienced teachers may also pose a barrier to changing practices (Grigg, Kelly, Gamoran & Borman, 2012; Polly & Hannafin, 2011).

In the knowledge economy, core skills such as collaboration, creative problem solving, and digital literacy are necessary for college graduates to successfully navigate a complex web of information and thrive in the global environment (Eisner, 2010; Singapore Ministry of Education, 2012). Neuroscience research has shown that these domain-generic competencies are linked to effective memory retention and retrieval processes enabled by sustainable attention, multisensory engagement, and meaningful association (Hardiman, 2012) - learning features usually absent in a content-dissemination lecture setting.

Despite the limitations of lecture-style teaching suggested above, many classes in SPEI still rely on this didactic instructional mode. The next section elaborates the framework used to
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analyze the underlying factors associated with the lack of student-centered teaching practices among adjunct faculty in SPEI.

**Conceptual Framework**

In view of the complex dynamics associated with teacher decision-making processes and adoption of student-centered approaches, the contributing factors related to the problem of practice (POP) may not be adequately described using simple causal relationships between independent factors and instructional change (Oleson & Hora, 2014). The networked model of ecological systems theory proposed by Neal and Neal (2013) provides a framework to illustrate the relationships between adjunct faculty (i.e., the focal participants in this study) and the environment, as well as the intermediary forces that may or may not include the adjuncts. The networked model also allows a flexible way to define the relationships among the participants according to the nature of their interaction before determining the boundaries of the ecosystem. The networked diagram in Figure 1.1 represents the ecological system in which the adjunct faculty is situated.

While non-school factors such as the demographics and socioeconomic status of students have been shown to impact academic outcomes (Coleman et al., 1966), evidence suggests that lecture-based delivery may not be conducive to facilitating desirable learning engagement for the 21st century (Hardiman, 2012). Therefore, this study focuses only on adjunct faculty’s contribution to the teaching and learning process instead of non-school factors. Accordingly, I use the networked model in Figure 1.1 to examine how adjuncts decide teaching strategies they will use.
As shown in Figure 1.1, the adjuncts are located in the classroom microsystem where instructional decisions take place, depicted by the red line between A and S (A-S). The classroom is nested within another microsystem, comprising the interrelationships among institutional factors, PD, and students. These interacting forces have a direct influence on the instructional practice of the adjuncts, as shown by the connecting lines I₁-A, P-A, and S-A. Concurrently, interactions that take place among participants who are directly in contact with the focal individuals, but in settings that exclude them. These interactions termed as "mesosystemic interactions" (Neal & Neal, 2013; p.728) also exert pressure on adjunct faculty's classroom strategies. For example, I₁-P (e.g., institutional policy on PD) and I₁-S (e.g., the use of student evaluation for teaching performance appraisal). At the exosystem level, regulatory requirements (i.e., R) and the private educational landscape (i.e., I₂ representing other institutions) may indirectly affect the classroom microsystem. It is important to note that all the influences delineated above are reciprocal. This means that the adjunct's individual characteristics and their experience with each of the actors in the ecosystem have a moderating effect on their instructional decision making (Hora, 2012).
By examining the interactional influences outlined above, underlying factors associated with the limited student-centered strategies in the classroom may stem from the exosystemic and mesosystemic interactions surrounding the adjuncts. Although not directly involving them, these interactions may impose either positive or negative pressure on the instructional choices made by the adjuncts in the classroom. These external forces consist of broad societal or cultural factors pertaining to Singapore schooling and national policies. Equally influential are factors residing in the institutions (i.e., I₁ & I₂) and the mesosystemic forces across various systems within the organization (i.e., I₁-S & I₁-P). The assertions typically emerge from institutional policies and infrastructure inherent in private tertiary institutions, such as student admission standards, classroom configuration, curriculum structures, and instructional support systems (Kezar & Sam, 2013; Lo, 2014). Moving from external factors to the dimensions immediately interacting with adjuncts are institutional norms and practices concerning adjuncts (i.e., I₁-A & I₂-A), students' expectation and perception of adjuncts (i.e., S-A), and PD opportunities (or the lack of it) for adjuncts (i.e., P-A). While environmental factors may exert pressure on teacher behavior, the personal characteristics of each adjunct may lead to varying behavioral outcomes since individuals perceive and react to situational influences uniquely (Burn, Mutton & Hagger, 2010).

The following sections discuss in detail the themes identified above based on the synthesis of empirical research in both K-12 and higher education contexts. Although specific experiences of K-12 teachers and university faculty members may vary, common elements exist in the way teachers approach instructional reform (Kane, Sandretto & Heath, 2002). Therefore, cross-referencing literature may yield critical insights to understanding the POP. The themes are organized into five sections based on the analysis of the network model illustrated in Figure 1.1. First, I describe the exosystem (R) represented by the Singapore private educational landscape, along with the institutional responses to the environment (I₁-R and I₂-R). Second, institutional
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policies and mesosystemic interactions (I₁, I₁-S & I₁-P) pertaining to students, educational infrastructure, and the organization's commitment towards the PD will be discussed. The third section focuses on institutional and students’ influences directed specifically towards adjuncts (I₁-A, I₂-A & S-A), while the forth section elaborates on the current PD model available to adjuncts in SPEI (P-A). Finally, the personal characteristics of the adjuncts, which asserts some moderating effects on the environmental variables (A-P, A-I₁, A-I₂, and A-S) that may influence instructional decision and behavior will be examined in the fifth section.

The Exosystem: The Singapore Private Education Landscape

From 2002 to 2009, under the government’s policy directions to position Singapore as a Global Schoolhouse to attract foreign talents to the country (Lo, 2014), private institutions in Singapore flourished with an influx of international students due to the relatively lax control in the issuance of student visas. When the policy to attract foreign talents shifted in 2009 due to the negative public sentiments, unfavorable reports in teaching quality, and misleading marketing practices of some private schools in Singapore (Lim, 2009; Lo, 2014; Ng & Tan, 2010), stricter control on international student admissions as well as onerous terms on the quality of teaching and learning were imposed by the government upon the nations' private educational institutions.

To meet the requirements of the new regulatory framework introduced in 2009, private institutions in Singapore including SPEI had promptly established teaching and learning centers along with a plethora of PD programs. While familiar with the business aspect of educational administration, SPEI has limited experience in academic quality management matters such as teaching and learning, pedagogy, and course development. Therefore, teaching and learning centers may play a limited role in extending pedagogical support and adjuncts likely perceive the center’s efforts as a response to compliance rather than faculty development (Lim, 2009).
The next section relates the cascading effects of the changing private educational landscape and regulatory pressure on SPEI institutional policies, specifically with regards to the instructional support system (i.e., PD and initiatives aimed at enhancing teaching and learning quality) and the mesosystemic interactions between students and the institution.

**Mesosystemic Interactions: Institutional Factors**

Quality demands from regulators combined with downward student enrollment trends due to tightening measures on foreigners entering Singapore (Lo, 2014) are likely to affect institutional policies with regards to PD efforts (I1-P) and student admission (I1-S).

**Professional Development to fulfill business goals.** While the quick setup of teaching and learning centers and the associated PD programs are laudable, there were uncertainties about the institutional commitment towards nurturing the professional growth of adjuncts. Research suggests that the PD functions in higher education have evolved to focus on accreditation and facilitated enterprising opportunities such as fee-paying conferences (Fraser, Gosling & Sorcinelli, 2010). This phenomenon may be true for SPEI too, given the uncertain tangible returns from participating adjuncts who may either be teaching for only a single term or benefiting another competitor institution with their new found pedagogical skills.

**Curriculum and Educational Infrastructures.** Another obstacle to adoption of student-centered teaching approaches is linked to the rigidity of curriculum structures and classroom configurations (Henderson & Dancy, 2007; Lund & Stains, 2015). Lund and Stains (2015) conducted a mixed method study within the science, technology, engineering, and mathematics (STEM) disciplines in a large four-year institution. Although their data revealed different preferences for certain types of teaching strategy across disciplines, the average number of student-centered strategies adopted was highest among physics faculty, followed by those teaching biology, and lowest among chemistry professors. More chemistry and biology faculty
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members reported class size, layout, and content coverage as influential in determining their instructional choice. Classroom observation data also confirmed that more than half of the observed classes for biology and chemistry had over 100 students with fixed seating configuration, but only 36% of physics classes shared these characteristics. While Lund and Stains also found departmental norms and faculty attitudes towards student-centered teaching affecting instructional practices, their findings suggest that large classes and restrictive seating arrangement could be one of the influential factors to pedagogical decisions. Henderson and Dancy (2007) also highlighted curriculum and infrastructural restrictions as obstacles to student-centered teaching approaches in another study on physics faculty in a four-year higher education institution.

Adjuncts are often engaged to teach introductory classes (Baldwin & Wawrzynski, 2011; Landrum, 2009). The characteristics of lower-division classes (i.e., large group and content focus) are possible reasons for part-time adjuncts to prefer a teacher-centered assessment (i.e., multiple-choice) as compared to their full-time counterparts (Baldwin & Wawrzynski, 2011). Furthermore, adjunct faculty are expected to follow rigid syllabi that were developed independently of their input (Kezar, 2013). While such practices are imposed as measures to maintain the quality of the curriculum (Lim, 2009), the enforced curriculum structure leaves no room for adaptations by the adjunct faculty (Kezar, 2013). An adjunct's response in a qualitative study expressed this sentiment, "Now I don’t even have freedom in my own courses and in fact I’m supposed to follow a set syllabus and the content is controlled by a tenure-track faculty member. We don’t have any dialogue about the course..." (Kezar, 2013, p.584).

It is evident that mesosystemic forces in higher education may exert an intermediate but significant pressure on teaching approaches in the classroom microsystem even though adjuncts are not present in these interactions. In the following section, direct institutional and student
interaction with adjuncts will be explored to understand the possible effects on instructional practice.

**Direct Influences from Institution and Students**

Direct influences from management practices, departmental norms, as well as the student-teacher relationship play significant roles in shaping the adjuncts' classroom practice.

**Performance Management Policies**

Job role expectations and performance appraisal mechanisms, either in the visible form of student evaluation on teaching (SET) or implicit pressure from those in position of authority, may define the teaching practices of adjunct lecturers. Longitudinal studies of novice teachers document how they struggle to maintain their practice to align with constructivist learning principles, amidst conflicting demands from their supervisors, end up conforming to didactic teaching (Loh & Hu, 2014; Martell, 2014). If the pressure of performance expectations leads to behavioral shifts against espoused beliefs within a stable fulltime employment system, the likelihood of conformance for adjunct lecturers may be more prevalent since the continuity of their employment is highly dependent on the approval of the administrators (Kezar & Sam, 2010). While management expectations play a role in shaping practices, high levels of autonomy typical of higher educational institution also mean faculty members have the flexibility to determine their instructional choices. Few opportunities for institutional engagement are likely to result in adjuncts relying on their own teaching preferences, commonly influenced by their own previous experience as teachers or students (Oleson & Hora, 2014), identity as an adjunct, and job satisfaction (Eagan, Jaeger & Grantham, 2015; Levin & Hernandez, 2014).

In addition to normative expectations, the re-appointment of adjunct faculty is subject to acceptable teaching performance which is based primarily on SET (Lim, 2009). In Langen's (2011) study to investigate how the teaching performance of adjuncts is evaluated, 95% of 155
administrators from 22 higher education institutions in the United States reported that they relied on SETs for adjunct faculty re-appointment decisions. While SET is also the primary instrument used to evaluate the teaching effectiveness of full time faculty in many higher education institutions, the validity of this approach remains debatable (Oon, Spencer & Kam, 2016; Spooren, Brockx & Mortelmans, 2013). In the adjunct context, the consequence of SETs is higher stakes than full-time faculty, possibly creating more anxiety and representing a greater deterrent to pedagogical innovation (Kezar, 2013; Waltman, Bergom, Hollenshead, Miller & August, 2012).

Although adjuncts crave feedback on their teaching, the student evaluation system is perceived as ineffective to promote growth. Adjuncts viewed the mechanism as a bureaucratic process that makes them feel vulnerable to student feedback (Kezar, 2013; Waltman et al., 2012). Separate studies on the impact of student evaluation on general higher education faculty (non-specific to adjuncts) also revealed poor developmental value for teaching enhancement (Stein et al., 2013; Surgenor, 2013). Furthermore, experimentation with new teaching approaches may incur risks of low evaluation scores due to the students' perception of additional workload (Walder, 2015).

**Working Conditions**

In a survey of 488 faculty members, Campbell and O'Meara (2013) found that favorable work environment as defined by the intention and participation towards any goal-directed activity related to their careers has a positive effect on faculty agency. Structural equation modeling confirmed that departmental factors, namely work-life balance, person-department fit, and PD resources have significant and positive influence on faculty agency. This finding is consistent with Duffy and Lent's (2009) quantitative study suggesting that institutional climate and perceived organizational support contribute positively to work satisfaction, which in turn
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increases the research participants' confidence to participate in work-related goals (defined by them as goal participation). These studies point to the necessity of understanding the adjunct faculty employment situation in order to shed light on the possible organizational factors that may influence their classroom practices as well as their interest in experimenting with new teaching strategies.

Kezar (2013) conducted multi-case research involving 107 part-time (PT) and full time (FT) non-tenure track faculty to examine how working conditions affect faculty teaching performance. Interviews, observations, and documentary analysis in three, four-year institutions across 25 departments revealed common experiences of unsupportive department practices for both PT and FT groups. Particularly salient policies that negatively shape the PT non-tenure track faculty’s (i.e., adjuncts) ability to provide quality student learning include short notification of class schedules, low commitment for re-appointment, travelling between multiple institutions, and poor teaching infrastructure. Although PT non-tenure track faculty also expressed dissatisfaction with regards to exclusion in curricular decisions and absence of instructional mentoring, these factors were reported as impacting the faculty performance to a lesser extent. Building upon her qualitative findings, Kezar (2013) asserts that there is a disparity in the working conditions in the aspects stated above between tenure and non-tenure track faculty (including those in part-time employment). This gap in work condition not only deprives non-tenure track faculty of the opportunity to deliver effective learning to students, but also reduces their commitment to the teaching role. Similar findings were also observed by Waltman, Bergom, Hollenshead, Millerm, and August (2012). For example, an adjunct instructor shared:

[If] you have to go out and find additional [employment], you’re not going to invest in the class in the way that [you would] if you’re supported and have the space to think
about what this course is and how you are actually engaging students and what you’re trying to get them to learn. You’re just going through the motions at some point (p. 423). In addition to the adverse work arrangement which likely exacerbates adjunct faculty members’ reluctance for instructional change, institutional norms and cultural variables may also affect responsiveness to innovation.

**Norms and Culture**

Patterns of acceptable behavior are known to exist in social groups and may impress certain constraints upon the members unknowingly (Aarts & Dijksterhuis, 2003). A mixed methods study involving 436 survey participants and 56 interviews in three research universities in the United States, found weak or no perceived norms (i.e., departmental expectations) for student-centered instruction. However, significant variation in norm strengths was observed across institutions and discipline (Hora & Anderson, 2012). Among 22 of the interviewed respondents who reported regular use of student-centered teaching, only three attributed their instructional decision to perceived norms. Also notable was the discovery of tacit norms for instructional autonomy and norms instantiated by content-heavy syllabi. This finding implies normative behavior in higher education environments may be linked to a strong sense of autonomy and curriculum requirements instead of a perception of departmental expectation for innovative teaching.

Besides explicit or tacit norms, studies have also shown that a supportive school culture benefits instructional innovation (Fullan, 2001; Zhu, 2015). Zhu and Engels (2014) gathered perception survey data from 1,051 students and teachers to examine the organizational culture of six Chinese universities. Each university in the study was selected from different classification in terms of governance (i.e., national, provincial, and municipal), research, or trade-focus. Analysis of Variance (ANOVA) indicated significant cultural variance across institutions with type A
university (i.e., a first-class national comprehensive university) showing higher aggregated scores for instructional innovations, defined as the faculty reported implementation level of collaborative learning student-centered learning, e-learning, and computer-supported collaborative learning. When controlling for institution and demographic variables, cultural dimensions such as openness to innovation, leadership, and collaborative relationship significantly predict faculty self-reported implementation of student-centered learning. This suggests that localized features of culture play an important role in determining practices. Localized features of culture that shape teaching practices are also observed in other studies, for example, departmental and course-level variation in the expectation of content coverage (Hora & Anderson, 2012; Lund & Stains, 2015), disciplinary differences (Baldwin & Wawrzynski, 2011), and individual characteristics of voluntary and involuntary adjuncts (Eagan, Jaeger & Grantham, 2015). To this end, an examination of normative behaviors and sub-cultures may be necessary to gain a nuanced understanding of adjuncts' instructional decision making. Beyond the social circles with peers and department, the adjuncts' relationship with students is arguably as influential in determining classroom practice, since students are the main beneficiaries of their pedagogical choices.

**Receptiveness of Students**

In a study about students' attitude on learner-centered teaching and faculty's reflection in response to the students' attitude, Bishop, Caston, and King (2014) found students generally prefer and expect lecture style delivery although they welcome a combination of visually appealing presentation with less text. Students also expressed their desire for professors to simplify the materials from the textbooks by giving them an outline. They prefer to work individually and dislike small group learning for fear of "free-riders" who do not contribute their share of work. Based on the feedback of students, the seven faculty who were interviewed
reflected that students prefer a structured learning environment and looked to them for straightforward transmission of content. This finding suggests that students' expectations may be associated with teacher’s instructional decision.

Interestingly, contrasting evidence was observed in another similar study conducted by McCabe and O'Connor (2013). In this study, five faculty members who adopted student-centered strategies were selected for the interview, along with focus group discussion for 36 students who were taught by the five professors. Students responded favorably to the student-centered practices; they appreciated the opportunity to work with peers and freedom to express their ideas in class. Students also reported a sense of satisfaction for completing group assignments. While faculty members acknowledged the value of student-centered teaching, they cited increased workload and the mismatch of certain content with student-centered strategies. From the case studies above, it may be concluded both the students and teachers' behavior have reciprocal effects in shaping the classroom climate.

**Limitations of Professional Development Model**

Contextual factors inherent within educational systems and organizational practices typically exert constraints that cannot be readily lifted. On the contrary, PD may be used as a change management strategy to systematically introduce innovation (Rouseff-Baker, 2002; Fraser et al, 2010). While adjuncts have traditionally been excluded from PD, there is increasing evidence of the shift towards more supportive structures for adjuncts faculty (Hamilton, Fox & McEwan, 2013; Smith & Valentine, 2012). However, it is uncertain how the structure and content of PD benefit adjuncts with respect to the adoption of student-centered practices. The current provision of PD in SPEI is primarily instructor-led sessions organized episodically. The limitations of such a model are described below.
Access and Transfer of Learning

Adjuncts teach in multiple institutions or have full-time employment outside academia (Kezar, 2013; Kezar & Sam, 2011). With the absence of common break time, scheduled PD sessions will have less appeal to adjuncts because of challenges in travelling between classes situated elsewhere or timetable conflicts (Kezar, 2013; Sandford, Dainty, Belcher & Frisbee, 2011). Coded themes from interview responses of 85 part-time faculty in a U.S. public university showed that three quarters of the adjuncts missed the orientation session primarily due to alternative commitments and schedule conflict (Meixner, Kruck, & Madden, 2010).

Student-centered instructional strategies are more complex than lecture-based delivery. Therefore, fidelity of student-centered techniques after PD may be low (Grigg, Kelly, Gamoran, & Borman, 2012; Polly & Hannafin, 2011). Observations on the enactment of student-centered practices in the classroom have revealed missing elements critical to the constructivist intention (Lund & Stains, 2015). In a large scale randomized trial across 73 schools involving 196 teachers to investigate the effectiveness of two PD interventions on classroom practices, multilevel logistical regression analysis showed that the likelihood of observing scientific inquiry pedagogy is 84% higher for lessons conducted by teachers who have undergone extensive and targeted training as compared to those who attended one-day workshops (Grigg, Kelly, Gamoran, & Borman, 2012). However, only selected features that the teachers experienced more frequently in the PD were successfully carried out in the classroom. Review of literature in the higher education context also concluded that one-time interventions are generally less effective than extended PD for transfer of practice (De Rijdt, Stes, van der Vleuten, & Dochy, 2013; Saroyan & Trigwell, 2015).

Unfortunately, instructional reform initiatives in higher education are usually characterized by episodic PD sessions focusing on dissemination of purpose, nature, and student
learning outcomes associated with the innovative practice (Bickerstaff & Cormier, 2015).

Interviews of 103 community college faculty members involved in developing their teaching towards a more student-centric paradigm found that one of the frequently cited concerns includes difficulty in classroom integration of new strategies. While there were conversations about successful experiences during PD events, decontextualized sharing sessions among heterogeneous faculty members were unable to facilitate the transfer of what works in one class to another (Bickerstaff & Cormier, 2015). On the other hand, deNoyelles, Cobb, and Lowe (2012) concluded positive responses from faculty members who have experienced PD with features that included optional face-to-face sessions, embedded practice in the classroom, and peer review opportunities. These findings suggest that the current single session PD in SPEI may not be conducive to providing follow-up support and contextualized transfer of pedagogical skills into the classroom.

**Absence of Collegial Support**

Confronted with complex instructional changes, adjuncts may find it challenging to initiate and persist in an educational innovation without a supportive community (Bakkenes, Vermunt, & Wubbels, 2010). In a mixed method study to investigate the learning experience of 94 secondary teachers in a Dutch national innovation program to incorporate self-regulated learning (SRL) in the classroom, cross tabulated frequencies of themes abstracted from the teachers' reflection log showed that teachers who attempted SRL on their own experienced negative emotions and struggled to revert to old ways of teaching. On the contrary, those who participated in collaborative projects managed to incorporate SRL through experimentation. This affirms that standalone pedagogical workshops without the opportunity for community interaction to support subsequent experimentation are unlikely to sustain adoption of new teaching practices. Literature reviews on the diffusion of innovation in higher education further
validate the importance of supportive network and socialization of practice (Smith, 2012; Zhu & Engels, 2014).

While collaborative learning offers great potential for scaffolding and developing collective efficacy, competition among adjuncts who teach similar subjects and the uncertainty of re-appointment may hinder meaningful academic socialization (Kezar & Sam, 2013). Every adjunct faculty member interacts with each other and the environment through the interpretative lenses of personal preferences and mental models. The next section explores how individual characteristics might interfere with relationship and situational variables to determine behavioral outcomes.

**Personal Characteristics of Adjunct Faculty**

Contextual impediments, social norms, and ineffective PD strategies may restrict the adoption of student-centered practices; however, teachers' behavior varies even when confronted with similar obstacles. This suggests the multi-dimensional nature of teaching responsibility and the moderating effect of individual characteristics (Hora, 2012 & 2014). The following sections synthesize the implications of adjunct personal attributes on their approaches to teaching.

**Teaching Experience and Competence**

Higher education faculty members are typically valued for their disciplinary knowledge and may be underprepared for instructional responsibility (Lattuca, Bergom & Knight, 2014). In the case of adjuncts, industry expertise and illustrious careers are often key reasons for engagement (Kezar & Sam, 2011, 2013). Therefore, pedagogical development may not necessarily be considered as a priority among faculty members who must negotiate competing demands of teaching load (Houghton, Ruutz, Green & Hibbins, 2015; Stewart, 2014; Strage & Merdinger, 2014; Van Schalkwyk, Leibowitz, Herman & Farmer; 2015). Compounded with employment situations that constrain access to PD, adjuncts are unlikely to grow in their
pedagogical knowledge and may continue to practice with a limited repertoire of teaching strategies (Kezar, 2013; Meixner, Kruck & Madden, 2010).

Learning Disposition

While mismatch of skills and limited teaching experience may hinder the shift towards student-focus instructional practice, low participation in PD activities as well as limited attempts at pedagogical experimentations point to other potential factors. Carol Dweck (2007) introduced the idea of growth and fixed mindset in her research. Individuals who associate intelligence or talent to be malleable through hard work possess a growth mindset. They thrive on challenges and put in effort to stretch their existing abilities. On the other hand, those with fixed mindset believe that abilities are static. They assume inherent traits define success and focus their energy on documenting achievements and avoiding failure. Quantitative analysis of self-reported data from 87 university instructors found that the attribution to growth through effort (i.e., growth mindset) is a significant predictor of behavioral measure of PD interest (Thadani, Breland & Dewar; 2015). This result is consistent with Burn et al.'s (2010) case studies of 17 teachers. The researchers noted the reciprocal influence of learning disposition and supportive work environment on professional learning. Despite being constrained by the environment such as teacher-centric departmental norms or restrictive classroom configurations, teachers who demonstrated strong aspirations for learning for themselves and for their students were able to recognize gaps in their own practice and proactively seek out resources to widen their teaching repertoire. The converse is true for those who have a stable learning disposition (i.e., fixed mindset).

Situated in a context where institutional feedback systems and departmental norms endorse lecture-based lesson delivery, adjunct faculty members with a fixed mindset are likely to have little interest in pedagogical innovation or PD, especially if they perceive themselves to be
already demonstrating successful instructional routines. In contrast, those with low teaching self-efficacy may not see themselves as able to successfully improve the quality of learning with student-centered approaches (Burn et al., 2010). The following section explores how the adjuncts’ assumptions about learning and knowledge are manifested in teaching behaviors as well as influencing their SCI decisions.

**Conception of Teaching**

The way faculty members teach is influenced by their experience as an instructor, as a student, as well as by encounters outside the classroom (Oleson & Hora, 2014). Drawing upon data collected across two studies involving 8,000 students and 400 teachers in large first-year classes in Australian universities, Prosser and Trigwell (2013) linked self-reported university teaching approaches as significant predictors of students' learning approaches. Multiple regression analysis using the Approaches to Teaching Inventory scale (Prosser & Trigwell, 2013) and Study Process Questionnaire (Biggs, 2011) indicated that teachers who hold the view of learning as conceptual change and embrace student-focused teaching are linked to students who engage in deep learning. Significant correlation was also observed between transmission approaches to teaching and surface learning characteristics (Prosser & Trigwell, 2013). Although observations of enacted practice were not investigated in this study, distinction between transmission view and constructivist beliefs were confirmed through interviews with selected respondents from the two groups (Prosser & Trigwell, 2013). The role of pedagogical belief in shaping practice can also be observed in a mixed method study from a smaller study in a single institution using the same teaching approaches inventory scale (Lund & Stains, 2015). Lower scores in the conceptual change/student-focused scale were matched to higher percentage of lecture delivery mode informed by classroom observational data.
Mismatch Between Belief and Practice

Although teaching conception has been found to significantly influence instructional choice as described in the previous section (Lund & Stains, 2015; Prosser & Trigwell, 2013), problematic practices still prevail among teachers who have articulated strong constructivist beliefs (Chen, 2008; Polly & Hannafin, 2011). A possible explanation for the mismatch between espoused pedagogical beliefs and enacted instructional strategies are the differing interpretations of constructivist practice (Cobb & Bowers, 1999) along with the ambiguous conceptualization of SCI (Hora, 2014). Lund and Stains (2015) reported missing core elements when faculty contextualize SCI for their classes. Such partial implementation of SCI is likely due to incomplete understanding of constructivist perspectives leading to inefficient strategies as well as confusion of busy activities for targeted learning. For example, a faculty member professing to adhere to constructivist learning principles organized his lesson with only project work with rubrics for students to guide themselves in groups of three or four. There were no lectures and students were required to complete assigned readings on their own. Students were frustrated and felt lost because the instructor would only point them to more resources (Reiser & Dempsey, 2012). Self-reported data often revealed SCI implementation after PD, but lesson observations showed deviations and transmission-focused strategies (Ebert-May et al, 2011).

Conclusion

This review sought to understand the barriers to student-centered instructional practices from both the institutional and adjunct faculty perspectives. Extant literature suggested that the determining factors of classroom practices are not independent and may be conceptualized differently by researchers. While institutional structures and the complexity of the instructional tasks pose common challenges to changing practice in the undergraduate classroom, the tenuous employment situation of adjuncts, as well as their personal characteristics add several restrictive
dimensions to achieving student-centered practices. To balance between commercial interest and provision of quality education in SPEI, organizational barriers such as hiring practices and curriculum structures are unlikely possibilities of intervention.

The next chapter sought to explore the prevalence of lectures and examined the potential institutional barriers to SCI in my professional context. Adjunct faculty perception of teaching approaches as well as preferred professional learning strategies were investigated to gain insights on how environmental factors identified in the conceptual framework, specifically, SET, working condition, and norms, interacted with personal factors and how they are manifested in the adjuncts’ instructional practices in SPEI.
Chapter 2

College graduates are underprepared for the 21st century workforce (Cho et al., 2015; Kamei et al., 2012; Wismath, 2013). In the knowledge economy, core skills such as collaboration, creative problem solving and digital literacy are necessary for graduates to successfully navigate complex web of information and thrive in the global environment (Eisner, 2010; Singapore Ministry of Education, 2012). While there are many factors associated with the lack of work-readiness among higher education graduates, one of the reasons is poor learning engagement in the undergraduate classrooms arising from the prevalence of lecture-based teaching (Cho et al., 2015; Kamei et al., 2012; Wismath, 2013).

Complex interrelationships between institutional, curricular, and regulatory drivers (Hora, 2012; Lund & Stains, 2015), as well as the personal characteristics of faculty members including efficacy, pedagogical beliefs, and learning preferences have a combined influence on classroom practices (Bickerstaff & Cormier, 2015; Burn, Mutton & Hagger; 2010). With the majority appointed as adjunct faculty today (American Association of University Professors, 2016; Lim, 2009), the unfavorable circumstances surrounding adjunct employment potentially aggravate the already sluggish adoption of student-centered practices. Concerns over job security, compensation, and the lack of supportive working condition such as dedicated workspaces and printing services present a burden on adjunct faculty to perform on par with those in full-time teaching positions (Eagan, Jaeger & Grantham, 2015, Kezar, 2013).

Context of Study

In SPEI, over 90% of the curriculum is delivered by part-time, adjunct faculty. Students attend three-hour lessons typically delivered through lectures. Although SPEI has introduced student-centered instructional practices through PD initiatives, the participation in PD is below expectation and there is little evidence of instructional change. Based on a synthesis of literature
in chapter one, limited implementation of student-centered instruction may be traced to institutional barriers, personal factors, and limitation of the PD model in supporting pedagogical innovation. A needs assessment study was conducted to gather information from adjunct faculty members to identify prevailing teaching approaches in SPEI and collect empirical evidence on the underlying factors associated with the POP.

**Purpose of Needs Assessment**

While broad themes associated with teacher instructional choices emerged from the review of literature, variations exist in the conceptualization of decision-making processes and behavior change as well as in the measures of student-centered practices. Additionally, simple causal relationships between influencing factors and observed practices are unlikely (Oleson & Hora, 2014). Although there is evidence linking job satisfaction to engagement in PD and pedagogical innovation (Campbell & O’Meara, 2013; Thadani, Breland & Dewar, 2015), disparity in instructional choices vary across institution type, discipline, and faculty demographic profiles (Bettinger & Long, 2010; Lund & Stains, 2015). Therefore, systematic data collection in the SPEI context is necessary to better understand the instructional practices of adjuncts as well as gain insights into how various factors interact in shaping their decision to embrace student-centered teaching approaches. The salient aspects identified through this needs assessment were used to identify appropriate supportive mechanisms (Soriano, 2012) to enable the shift from a content-focused to a learner-centric classroom climate in SPEI.

Based on the Neal and Neal's (2013) networked model of ecological system theory, I conducted a needs assessment study to examine the following research questions:

- To what extent are student-centered teaching strategies implemented by adjunct faculty? (RQ1)
• What contextual factors influence adjunct faculty's adoption of student-centered teaching? (RQ2)

• In what ways do adjunct faculty’s perception of student-centered teaching influence their instructional decision? (RQ3)

• How do adjunct faculty engage in professional learning? (RQ4)

I anticipated limited student-centered practices among the adjuncts from the needs assessment findings. This study also highlighted specific institutional factors likely to restrict the implementation of constructivist practices. Furthermore, expected differences across individual faculty's perception of student-centered teaching and preferences in professional learning may lead to varying levels of innovative classroom practice.

Research Design

I employed a mixed method explanatory sequential design (Creswell & Plano, 2011) for the needs assessment study. A survey was conducted to gather quantitative data on the general instructional patterns, perceptions on working environment and SCI, and professional learning patterns. While other instruments may also be suitable for the needs assessment study, I selected survey research for this study because it is an efficient way to collect responses for several variables in this study with the potential of generalizing the findings across SPEI adjunct faculty population (Schutt, 2015). The questionnaires were administered via an electronic survey platform hosted on the in-house server of SPEI. As the online platform is a familiar interface adjunct faculty use to register for professional learning events and to complete their bi-annual training needs analysis, this method was able to capture a representative sample (O'Leary, 2014). In addition to the online survey, I included participant selection for lesson observation and interviews to obtain further insights on the quantitative responses, specifically on adjuncts’ actual classroom practices and their thinking related to instructional choices.
Participants

A total of 289 adjunct faculty members in SPEI who have taught at least one course from January 2015 to April 2016 were invited to participate in this needs assessment study. An online questionnaire, along with a statement of informed consent and purpose of study were emailed to the target population in early May of 2016. Due to the initial poor response, the questionnaire remained open for participation until September 2016 with two email reminders sent in June and August. Participation in the survey was entirely voluntary and yielded a response rate of 31.1%. Of the 90 respondents, 24.4% were women, the remaining were men and one unspecified gender. Of all the responses (Table 2.1), 34.4% (n=31) reported teaching for more than 15 years, 20.0% (n = 18) 11 to 15 years, 24.4% (n = 22) six to ten years, 15.6% (n = 14) two to five years, and 4.4% (n = 4) fewer than two years. As SPEI works with multiple universities to deliver their programs, some of the adjunct faculty teach similar courses across several university programs, which have different curricular structures and assessment requirements. Accordingly, respondents were asked to indicate the courses that they are teaching. The majority of the respondents teach in one (n = 61) or two university programs (n = 16), although a few (n = 7) teach across three programs and one participant teaches in four different university programs.

Table 2.1

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Measures

The indicators of the measures for the needs assessment study were presented in an online survey (Appendix A). The sections below describe the quantitative and qualitative indicators used to investigate the underlying factors associated with my POP.

Extent of SCI adoption. SCI strategies were defined based on teaching approaches aligned with constructivist principles adapted from existing studies (Baldwin & Wawrzynski, 2011; Hora, 2012; National Research Council, 2012; Smith & Valentine, 2012), with a slight change in the names to follow the common understanding of the SPEI professional context. This study included twelve student-centered strategies along with the lecture method. Participants responded to online survey questions (Appendix A, item 9) on how often they use each strategy by indicating one of the six statements: "I am not aware of this method", "I am aware but never used the method", “once a term", "two to five times a term", "every other lesson", and "every lesson". Each statement is assigned with a score of “1” to “6”, with "I am not aware of this method" represented by “1” point and "every lesson" allocated with “6” points. The extent of SCI implementation by adjunct faculty is represented by the number of different strategies each faculty uses at least once for a particular term (indicated as “number of SCI”). The frequency that each of the 13 teaching approaches were implemented per term measures the preferences of a particular instructional method. Lesson observations and interviews were included to corroborate the online survey questions. The lesson observation form (Appendix C), was comprised of a list of thirteen SCI strategies and was used to trace the enacted SCI during a one-hour classroom observation. The interview protocol (Appendix C) included three questions to examine the adjuncts’ understanding of SCI. They were also asked to report the SCI implemented during the observed lesson. Where there was a mismatch between the self-reported and the observed strategies, adjuncts were prompted to elaborate their understanding of the SCI
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method. For SCI strategies indicated as being implemented in the online survey but was subsequently not demonstrated during the classroom observation, adjuncts were invited to discuss the scenarios in which the SCI would be implemented.

**Contextual influence.** Contextual influence is characterized by curricular and organizational structures inherent to the higher education environment (Koh, Chai & Tay, 2014; Lund & Stains, 2015). Organizational factors surrounding the employment of the adjuncts, collegial relationships, and support services may influence instructional choices (Hora, 2012). These indicators were derived from the items in the part-time faculty section of the Higher Education Research Institute's (HERI) Faculty Survey. Adjunct faculty responded to five questions under the contextual category (Appendix A, items 28 to 32), sample items are: “I am satisfied with the campus support services” (e.g. lecturer's lounge, computers, and etc.), “I have good working relationships with the administration team”, and “I am most concerned about the student evaluation on teaching.” The response options for each item were on a five-point Likert scale, ranging from 1 = strongly disagree, 2 = disagree, 3 = neither agree or disagree, 4 = agree, and 5 = strongly agree. The measure for each contextual indicator is represented by the mean scores of the Likert scale responses. Barriers to SCI also include class size and assessment components. Adjuncts were asked to indicate their typical class size as well as the weighting of the examination and course work components in the module they teach most frequently. Response options for class size were shown in categories “Less than 20 students”, “21 to 40 students”, “41 to 80 students”, “81 to 120 students”, and “More than 120 students”. With regards to assessment structures, adjuncts chose from five options, namely “100% weighting in final exam”, “Combination of assessment formats with higher % weighting in final examination”, “50% examination, 50% continuous assessment”, “Combination of assessment formats with
higher % continuous assessment”, and “100% continuous assessment”. Continuous assessment (CA) is a term used to describe course work and written assignments in SPEI.

**Teaching self-efficacy.** Moderating effects of personal factors such as belief system and learning conception on instructional decisions are represented by faculty perceptions of teaching strategies in the needs assessment. Teacher self-efficacy, defined as the teacher's perception of his or her own ability to effectively implement constructivist-based instruction to achieve desirable learning outcomes (Bandura, 1986; Thadani, Brelan & Dewar, 2015). Seven items (Appendix A, items 11 – 17) were adapted from the Teachers’ Sense of Efficacy Scale (Tschannen-Moran & Hoy, 2001). The selection of indicators included only the efficacy measure for instructional delivery. Participants indicated the extent to which they were able to deliver instruction that aligns with constructivist approaches. Sample items are, “How much can you do to adjust your lessons to the proper level for individual students?” and “How well can you implement alternative strategies in your classroom?” Participants were invited to respond along a five-point Likert scale ranging from "none at all", “very little”, “somewhat”, “quite a bit” to "a great deal."

**Conception of Teaching.** The second measure pertains to faculty beliefs about their own teaching approaches. For the purpose of this needs assessment study, eight items belonging to the conceptual change sub-scale of Approaches to Teaching Inventory (ATI) developed by Trigwell and Prosser (2004) were incorporated in the questionnaire (Appendix A, items 18 - 25). A five-point Likert scale with response options “rarely”, “sometimes”, “half the time”, “frequently”, and “almost always” was used for this measure. Sample items include: "I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop", "I feel a lot of teaching time in this subject should be
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used to question student’s ideas", and "I make available opportunities for students in this subject to discuss their changing understanding of the subject."

**Professional learning characteristics of adjuncts.** The operationalization of this construct was informed by the common themes reported in research linking faculty learning to higher education instructional reform as well as meta-analysis of educational development literature (Bakkenes et. al, 2010; Horn & Little, 2010; Ridjt et al., 2013; Webster-Wright, 2009). Adjuncts chose from one of five Likert scale items (never, hardly, sometime, often, and all the time) when asked which professional learning strategy they prefer when they encounter new changes in course content or teaching requirements (Appendix A, item 26). Example learning strategies included experiment with my current class, try to make sense of the change, research online for ideas, and attend a course in person or online. Participants also had the opportunity to give open comment on what might be the characteristics of good professional learning.

**Procedure**

This section elaborates the participant recruitment, data collection, and data analysis for the needs assessment study.

**Participant Recruitment**

A total of 289 part-time adjunct faculty members in SIMGE who have taught at least one course from January 2015 to April 2016 were invited to participate in this study. Adjuncts were recruited first through an emailed survey in May and later in September using a combination of email and personal invitation. Initially survey participants were given one week to complete the questionnaire. Due to the low response rate initially, a second and third email reminder were sent out and the deadline for participation was extended to September. Most adjunct faculty did not have lessons between May and August because this is the assessment period followed by term
break for the majority of the programs, therefore follow-up recruitment was carried out in September via emailed links as well as in-person survey completion using the researcher's Ipad.

**Data Collection**

The research strategy for this study followed the question-driven perspective to allow flexibility in determining the most suitable methods to obtain credible data instead of adopting the dichotomous view of quantitative or qualitative tradition (O'Leary, 2014). In addition to the online survey to collect faculty self-reported data, I also conducted interviews and lesson observations to corroborate the survey findings. For the online questionnaire, participants had the option to remain anonymous and skip questions. At the end of the questionnaire, adjuncts agreeable to having their lessons observed were invited to email the author with their contact information. The follow-up data collection aimed to verify the self-reported quantitative data. Due to the scheduling difficulty in conducting extensive lesson observation, only seven lesson observations were carried out based on convenience sampling.

**Data Analysis**

Descriptive statistics were used to summarize the frequency of adoption for each strategy, adjunct strategy usage per term, adjunct perception in terms of teaching efficacy and ATI score, and preferred professional learning strategies. Because of relatively high non-responses for some of the teaching strategies, the adoption frequency options for “once a term”, “two to five times a term”, “every other lesson”, and “every lesson” were aggregated to give a single measure, recoded as "used at least once a term.” Percentages of responses across the 13 teaching strategies were calculated to identify the most frequently used approaches (i.e., RQ1). Non-response rate of each strategy is also included in the analysis. Paired T-test was conducted between the most often implemented SCI and the lecture method to determine to what extent the difference in frequency of adoption was statistically significant. Qualitative data from lesson observation
captured the number of SCI implemented during the first hour of the lesson. Besides counting
the number of the SCI, I included field notes to document the teaching behaviors and student
responses at regular intervals. A brief interview was conducted after the lesson observation to
clarify the adjuncts’ instructional choices (see Appendix C for the lesson observation form and
interview script).

A one-way ANOVA was used to compare the SCI usage across assessment structure and
class size grouping (i.e., RQ 2). I estimated Spearman correlations to investigate the correlation
between SCI adoption and teacher self-efficacy as well as conception of teaching (i.e., RQ3).
SCI adoption is indicated by the number of different strategies each faculty uses at least once for
a particular term, while the scores for each item in the TSES and ATI scales were aggregated and
computed as a mean for every respondent. Finally, a frequency chart provided the data for
adjuncts’ professional learning preferences (i.e., RQ 4).

Results

The following sections report the results of the data analysis and discuss the findings of
the data according to the sequence of the five research questions.

Extent of SCI Adoption

Survey responses, lesson observations, and interviews collectively provided insights into
the extent of SCI adoption. The following sections report the results of the data analysis and
discuss the findings for each of the instruments.

Survey responses. Of the thirteen instructional strategies (Appendix A, item 9a – 9j), the
lecture method was reported to be used by 94.4% of the respondents (n = 90). There were two
missing responses and two responses of “Aware but not used.” The survey data showed that the
adjuncts who reported “Aware but not used” were engaged only for project supervision work.
Interestingly, one respondent indicated being unaware of the lecture method. As shown in Table
2.2, differences exist in the number of adopters for the remaining twelve student-centered strategies. Among strategies used at least once a term, whole-class discussion was the second \((n = 71)\) most frequently used method after lecture, while computer simulation was the least used \((n = 20)\). The number of SCI implemented at least once a term ranged from 0 to 12 \((M = 6.06, SD = 2.64)\). Likewise, SCI strategies reported as being aware of but not implemented ranged from 0 to 12 \((M = 4.51, SD = 3.01)\). It is also noted that 43\% of the adjuncts were aware of six out of the twelve SCI but did not implement them. The inadequate use of SCI is evident in Table 2.2.

Beside the lecture method, only whole-class discussion was implemented by 50\% of the respondents in every other or every lesson.

Table 2.2

Percentage of responses by teaching strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>% No response ((n))</th>
<th>% Not aware ((n))</th>
<th>% Aware but not used ((n))</th>
<th>% Used at least once a term ((n))</th>
<th>% Used every other or every lesson ((n))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>2.2 (2)</td>
<td>1.1 (1)</td>
<td>2.2 (2)</td>
<td>94.4 (85)</td>
<td>93.3 (84)</td>
</tr>
<tr>
<td>Whole-class discussion</td>
<td>4.4 (4)</td>
<td>1.1 (1)</td>
<td>15.6 (14)</td>
<td>78.9 (71)</td>
<td>50.0 (45)</td>
</tr>
<tr>
<td>Small group work</td>
<td>7.8 (7)</td>
<td>0 (0)</td>
<td>17.8 (16)</td>
<td>74.4 (67)</td>
<td>35.6 (32)</td>
</tr>
<tr>
<td>Case studies</td>
<td>4.4 (4)</td>
<td>0 (0)</td>
<td>25.6 (23)</td>
<td>70.0 (63)</td>
<td>33.3 (30)</td>
</tr>
<tr>
<td>Formative assessment</td>
<td>8.9 (8)</td>
<td>5.6 (5)</td>
<td>18.9 (17)</td>
<td>66.7 (60)</td>
<td>17.8 (16)</td>
</tr>
<tr>
<td>Problem-based learning</td>
<td>7.8 (7)</td>
<td>0 (0)</td>
<td>33.3 (30)</td>
<td>58.9 (53)</td>
<td>22.2 (20)</td>
</tr>
<tr>
<td>Oral presentation by student</td>
<td>8.9 (8)</td>
<td>0 (0)</td>
<td>38.9 (35)</td>
<td>52.2 (47)</td>
<td>15.6 (14)</td>
</tr>
<tr>
<td>Multiple drafts</td>
<td>5.6 (5)</td>
<td>2.2 (2)</td>
<td>46.7 (42)</td>
<td>45.6 (41)</td>
<td>17.8 (16)</td>
</tr>
<tr>
<td>Interactive demo</td>
<td>5.6 (5)</td>
<td>5.6 (5)</td>
<td>47.8 (43)</td>
<td>41.1 (37)</td>
<td>16.7 (15)</td>
</tr>
<tr>
<td>Concept map</td>
<td>8.9 (8)</td>
<td>11.1 (10)</td>
<td>42.2 (38)</td>
<td>37.8 (34)</td>
<td>16.7 (15)</td>
</tr>
<tr>
<td>Peer instruction</td>
<td>10.0 (9)</td>
<td>5.6 (5)</td>
<td>52.2 (47)</td>
<td>32.2 (29)</td>
<td>12.2 (11)</td>
</tr>
<tr>
<td>Real time polling</td>
<td>8.9 (8)</td>
<td>7.8 (10)</td>
<td>57.8 (38)</td>
<td>25.6 (34)</td>
<td>5.6 (5)</td>
</tr>
<tr>
<td>Computer simulation</td>
<td>11.1 (10)</td>
<td>10.0 (9)</td>
<td>56.7 (51)</td>
<td>22.2 (20)</td>
<td>4.4 (4)</td>
</tr>
</tbody>
</table>

With the average score computed from the 6-point scaled responses on the extent of SCI adoption (i.e., "I am not aware of this method", "I am aware but never used the method", "once a term", "two to five times a term", "every other lesson", and "every lesson"), I conducted paired t-
test analysis to compare the extent of adoption between lecture and whole-class discussion. The results yielded statistically significant differences in the scores for lecture \((M = 5.65, SD = .912)\) and whole-class discussion \((M = 4.49, SD = 1.49)\); \(t (83) = 6.07, p = .000\). The difference in the mean between lecture and whole-class discussion is 1.16 with a 95% confidence interval ranging from .78 to 1.55. Cohen’s \(d\) was computed at .662 indicating a moderate effect size (Cohen, 1988). This finding suggests that the adjuncts displayed a statistically significant preference for the lecture method as compared to whole-class discussion, which was adopted by only half of respondents.

**Lesson observation.** Lesson observation data for seven adjunct faculty revealed that the lecture method was the default strategy. During the 1-hour lesson observation, six of the participants spent between 30 to 45 minutes presenting content with PowerPoint. One participant (DT) projected his progressive construction of a concept map as he explained the topic using the visualizer equipment throughout the one-hour lesson observation.

Out of the twelve SCI practices included in the survey, concept map, whole-class discussion, and real-time polling were apparent in some of the adjuncts’ teaching. For example, RT demonstrated whole-class discussion strategy when he invited students to critique a newspaper advertisement based on the principles he just presented. There were multiway dialogues among his students as well as between him and the students while he picked up certain responses and built on them to extend the discussion. Another SCI example is real-time polling implemented by AL who used a mobile application called “Socrative” at the beginning of his lesson. AL asked his students to attempt a self-paced quiz on their mobile devices as a way to recapitulate key points from previous lesson. Upon submission of the quiz, students’ answers were displayed real-time on the screen along with the correct answers. AL then acknowledged students with high scores and encouraged those with poor performance to review the past week’s
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materials. Although real-time polling provided the opportunity for students to interact with the course content, AL did not elaborate students’ thinking process to getting the correct answer, neither did he link the quiz to his subsequent topic. In this regard, the benefits of an SCI method such as real-time polling, in promoting active learning and higher-order thinking, were not evident. The SCI methods implemented during the lesson observations are shown in Table 2.3 (under the column “Observed in lesson”).

Table 2.3

*Lesson observation and interview responses on SCI*

<table>
<thead>
<tr>
<th>Participant /SCI</th>
<th>Observed in lesson</th>
<th>SCI embedded in curriculum as reported in the interview</th>
<th>Indicated as implemented but not observed by researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT</td>
<td>Lecture &amp; whole-class discussion</td>
<td>Small group work, case study, oral presentation, formative assessment</td>
<td></td>
</tr>
<tr>
<td>DT</td>
<td>Lecture &amp; concept map</td>
<td>Not applicable: 100% exam</td>
<td>whole-class discussion</td>
</tr>
<tr>
<td>AL</td>
<td>Lecture &amp; real-time polling</td>
<td>Formative assessment, computer simulation (excel)</td>
<td>whole-class discussion</td>
</tr>
<tr>
<td>PO</td>
<td>Lecture</td>
<td>Formative assessment (three written assignments), small group, case study</td>
<td></td>
</tr>
<tr>
<td>EL</td>
<td>Lecture</td>
<td>Small group work, case study, oral presentation</td>
<td>whole-class discussion</td>
</tr>
<tr>
<td>RF</td>
<td>Lecture &amp; whole-class discussion</td>
<td>Formative assessment, problem-based learning</td>
<td>small group work</td>
</tr>
<tr>
<td>RY</td>
<td>Lecture</td>
<td>Small group work, case study, oral presentation, formative assessment</td>
<td>whole-class discussion, peer instruction</td>
</tr>
</tbody>
</table>

**Interviews.** To supplement the data from the lesson observations, I interviewed the seven adjuncts to understand their self-reported SCI, which were not observed in the actual classroom practice. The interview responses are summarized in the second and third columns of Table 2.3. Two main themes emerged in the interview data. The first relates to assessment methods that are part of the curriculum structure, such as group projects, oral presentation, and written assignments. Adjuncts viewed these strategies as a form of SCI. For example, if students are required to submit an assignment based on a case study as part of the module requirement, the
interview participants considered this as an implementation of the “case study” SCI. I included these responses in the column “SCI embedded in curriculum as reported in the interview”.

During the interview, participants were also asked to list the SCI method implemented during the 1-hour observation. Strategies reported but not observed by the researchers are indicated in column “Indicated as implemented but not observed by researcher”.

Everyone except participant PO indicated during the interview that they implemented whole-class discussion during the observed segment of the lesson. RF mentioned that the students were seated in their small groups, while RY stated he incorporated peer instruction. Upon further probing, it became evident that there were differences in the adjuncts’ understanding of SCI with the research-based definitions typically associated with SCI. For example, participant DT considered his regular questioning to the class as he constructs the concept map as a form of discussion,

As the concept that I teach is built from the previous lesson, I discuss with the whole-class to get them to recall the subtopic to be included in the branches of the concept map. Usually I have to prompt them with several leading questions, before they get to the right answer.

RY regarded peer instructions as getting students to rely on their friends for missed assignments. He stated, “From day one I emphasized to my students that I want them to be independent learners, so I am not going to repeat any information already explained. They just have to find out from their friends if they miss my class.”

Adjuncts also reported they implemented case studies, oral presentation, and small group discussion when students are expected to fulfill course work in these formats. They considered these techniques as SCI embedded in the curriculum. For example, in the Principles of Marketing course, RT’s stated that students worked in groups of three on a case study to develop
a marketing plan, followed by a group presentation. Accordingly, these are the SCI that he is currently implementing. On the contrary, RF and EL mentioned that they are familiar with oral presentation and problem-based learning techniques but did not implement them because these strategies are not part of the assessment structures in their modules. In terms of formative assessment, adjuncts considered this SCI method as the course work component (termed as “CA” in SPEI) in the modules they teach. When asked to elaborate how formative assessment was implemented, PO explained that his course comprised of three formative assessments, “30% of the course is formative. Besides the final exams, students must also write three 1,000-word essays during the term”. Another participant, AL shared his definition of formative assessment, “Formative assessments are meant to help students pass the module. In my Economics module, students often struggle with graphing in the final exams. At least the 50% weighting for the CA gives them a chance to score.” The absence of connection between formative assessment with the notion of timely and constructive feedback for developmental purposes in both the responses above suggests that the adjuncts may have an incomplete understanding of this SCI technique.

The interview responses provided important information about adjunct faculty conception of SCI. It can be inferred that the adjuncts’ view of SCI pertains to the procedural or behavioral dimensions of SCI but not necessarily the pedagogical value underlying the instructional strategies. While the high number of self-reported SCI adoption indicates that there may already be a variety of SCI embedded in the curriculum, some of the adjuncts implement SCI in a primarily information-transmission mode instead of facilitating meaning construction and self-regulated learning (Bransford et al., 2000; Weimer, 2013). In other words, the appearance of the instructional practice may be associated with SCI such as organizing students in groups or pairs, asking questions during lectures, and using interactive tools, but the focus of the activities
remains on getting the right answers and content coverage, which is not founded along the tenets of constructivism,

As shown in the survey responses and lesson observation, there are differences in the types and frequency of SCI adoption among adjuncts. The SCI implementation pattern is likely to be linked to curriculum requirements as stated by some of the participants. The section below analyzes the quantitative data to surface possible contextual influences.

**Contextual Factors**

To analyze the data collected for answering research question two, I used a one-way ANOVA and Pearson correlation to examine the relationship between indicators of contextual factors and adjunct strategy usage, computed as the average number of strategy used by each faculty. The contextual variables investigated include assessment structures, class size, departmental norms, concerns over student evaluation on teaching, and working condition (Appendix A).

**Assessment structures and class size.** A one-way ANOVA showed that the number of strategies used was linked to the examination weighting of the module. The five categories of examination weighting are “100% weighting on final examination”, “weighting of final examination is higher than CA component”, “50% examination and 50% CA”, “weighting of CA component is higher than final examination”, and “100% weighting on CA.” Final examination refers to end-of-course assessment in a controlled environment and CA represents coursework and written assignments. The result was statistically significant, $F(4,85) = 3.15$, $p = .018$, $\eta^2 = .13$. Post hoc comparisons using a Tukey HSD test showed that adjuncts who teach courses with 100% CA (i.e., coursework only, no examination component) implement significantly higher number of SCI ($M = 7.46$, $SD = 2.19$) then those assigned to teach examination-focused curriculum (i.e., 100% of the module grade depended on a single end-of-term examination, $M =$
4.76, \(SD = 2.60\) as well as modules with heavier weighting for the examination component than coursework, \(M = 5.45, SD = 2.63\).

In terms of class size, no significant difference was observed in the number of SCI adopted across class size groupings (i.e., “less than 20 students”, “21 to 40 students”, “41 to 80 students”, “81 to 120 students”, and “more than 120 students”). In SPEI context, it appears that courses with a greater emphasis on assessment are more likely to influence the strategy choices of adjuncts than class size. This observation is reasonable given that most of the assessments are determined by the partner university and adjuncts often do not have any visibility nor control over this aspect, therefore they may feel pressured to cover as widely as possible instead of engaging students in deep learning.

**Departmental norms.** Departmental norms are measured by the item “How much do your fellow lecturers / head of programs / program directors expect you to use other instructional strategies in this subject other than lecturing.” The extent of departmental norms on expected use of student-centered instruction is positively correlated with the number of strategies adopted by adjuncts (\(rs [89] = .41, p < .01\)). Due to the power distance between the adjuncts and administrators including head of programs who determine the continuity of their appointment from term to term, it is not surprising that expectations from those in positions of authority have significant effects in shaping classroom practice.

**Student evaluation on teaching.** A Spearman correlation was estimated yielding negative and weak correlation between the degree of concerns for student evaluation on teaching (SET) and number of SCI adoption; however, the relationship was not statistically significant. Analysis of open comments showed 6 out of 36 remarks about the pressure and subjectivity of SETs. Although correlation study and qualitative feedback did not reveal prevailing concerns for SET in relation to SCI implementation, 64% out of the total 90 survey participants reported that
they “agree” or “strongly agree” to the statement “I am most concerned about the student evaluation on my teaching”. This observation is consistent with the Kezar's (2013) qualitative study on adjuncts as well as the ongoing contention about the validity of SET in evaluating teaching effectiveness as discussed in chapter one (Oon, Spencer & Kam, 2016; Spooren, Brockx & Mortelmans, 2013). Based on the high percentage of responses indicating concerns about SET, it may be concluded that SET may be one of the factors shaping instructional practice.

**Working conditions.** No significant correlation was found between the number of SCI applications and organizational factors relating to campus support services ($M = 3.88, SD = .98$), working relationships with the administration team ($M = 4.51, SD = .71$), and collegial interactions with fellow adjuncts ($M = 3.68, SD = 1.02$). Although a Spearman correlation did not yield a noticeable association between working conditions and SCI strategy usage, an examination of the qualitative themes generated from the open-ended questions showed otherwise. Out of all of the open comments, 39% related to negative experiences with the institutional support system and 22% pointed to poor infrastructure (Appendix D).

A detailed analysis of the comments highlighted constraints imposed by institutional policies or classroom infrastructures on SCI. One of the respondents indicated, “… the lack of opportunities for students to present their work in front of the class takes away the learning concepts in university”. Another commented on the restrictions of theatre seating, “the current classroom system and layout is more suited for traditional lecture. Students at a young age need more engagement and activity, which is hard to do when the tables and chairs are fixed”, while another emphasized the need for good internet connectivity, “It is highly important for technology to be updated and available in the learning environment ... Immediate connectivity for students to push materials to screens and discuss what they are looking at” (Appendix D).
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The large number of comments pertaining to job satisfaction and perception of supportive institutional services implied that these are prominent issues affecting the morale and work commitment of the adjuncts. These factors indirectly and adversely impact readiness for SCI practice or instructional innovation (Kezar, 2013, Zhu & Engels, 2014). It also appears from the comments that some adjuncts were convinced of the value of SCI but felt that the identified institutional barriers prevented them from implementing such practices. There may be differences in how individuals perceived the contextual challenges described above. The next section examines the possible influence of teaching self-efficacy and conception about student-oriented teaching on SCI adoption.

Teaching Self-efficacy and Conception of Teaching

This section discusses the findings for the third research question. The teacher self-efficacy and ATI scales measured faculty perception of their ability to implement SCI and the extent they focus on conceptual change in their teaching approaches, across five-point Likert scales. A significant and positive correlation was observed for the whole group between teaching self-efficacy and the number of SCI adoption, rs (88) = .41, p < .01. However, no statistical significant correlation was observed for adjunct faculty's conceptual change approaches to teaching (i.e., ATI measure) and the number of SCI strategy adoption, rs (85) = .17, p = .11.

The items in the TSES efficacy measure refer to teaching practices that aligned to the SCI strategies listed in the questionnaire, therefore adjuncts who are confident in implementing a variety of assessment strategies, providing alternative explanation, asking good questions, and designing inquiry-based activities are more likely to adopt a higher number of SCI methods. Therefore, it is reasonable that the teaching self-efficacy scores correlate positively to implementing higher number of SCI techniques. However, the composite scores for the ATI subscale on student-orientation and conceptual change teaching approaches showed non-
significant correlation with the number of SCI adopted. This result suggests that adjuncts’ self-reported SCI may not necessarily reflect their intention to use a conceptual change approach to teaching, which is consistent with previous observations on their partial understanding of the constituents of SCI. While the TSES findings suggest that adjuncts with more favorable perceptions of their own ability to implement SCI were more inclined to adopt a higher number of SCI methods, it is not possible to conclude that the TSES measure is a predictor for SCI implementation. Given the weak to moderate Spearman’s rho, there are likely other factors that contribute to the self-reports of SCI implementation.

**Professional Learning Preferences and SCI**

The way adjunct faculty address instructional change may offer insights into the effectiveness of current PD approaches. When asked how adjuncts prefer to learn when confronted with change, less than 20% of the adjunct faculty chose to attend a course, either in-person or online. The preferred learning strategies involve problem solving (63.9%), making sense of the situation (61.2%), and doing online research (54.9%; see Figure 2.1). Interestingly, while more than half of the adjunct faculty found value in getting ideas from others (52.2%), they did not favor collaborative project work. This may be due to the limited time spent in the campus and frequent travel to multiple institutions for other teaching opportunities (Kezar, 2013). Schedule conflict and sporadic collegial interaction likely also resulted in little shared interest for collaboration.
The findings indicate a possible mismatch in the current event-based PD model with the professional learning preferences of adjunct faculty. Compounded with the fact that most adjuncts may perceive themselves as accomplished instructors, as inferred from the results in the previous section showing high levels of awareness in student-centered strategies, PD programs that focus on dissemination of thematic content may offer little value to their professional practice.

**Discussion**

The universal use of lecture indicates that it is critical to encourage more student-centered practices in SPEI. However, the current PD model may not meet the learning needs of the adjuncts since over 40% of the respondents reported that they are aware of six out of twelve student-centered strategies but have not implemented them in the classroom. This may be due to perceived institutional or curriculum constraints, low teaching self-efficacy, or mismatch in
teaching conception with the student-centered strategies explained in Chapter 1. Correlation data of these factors and the number of SCI offer further insights to this observation.

Expectations from peers and department heads on the use of SCI and concerns for SETs are institutional factors that impact instructional decision as indicated by the positive correlations with SCI. However, these contextual barriers may be alleviated by a strong sense of teaching self-efficacy, as confirmed by the positive and moderate correlation of TSES scores with number of SCI. Qualitative data from interviews and lesson observations revealed gaps in the adjuncts’ understanding of SCI. While many reported that they were aware of or adopting a variety of SCI methods, these strategies were implemented in a content-transmission manner with limited adherence to the constructivist approaches to learning. In summary, strengthening teaching self-efficacy and shifting teaching conception towards constructivist approach are actionable factors that I could address in my intervention. However, the influence of curriculum requirements and departmental norms with regards to SCI are important considerations.

Limitations and Conclusions

In summary, the lecture method is the main instructional method adopted by adjunct lecturers in SPEI. Although a variety of SCI strategies were reported to be used, self-reported data may be subject to agreement bias (Schutt, 2015) and incongruence of espoused and enacted practice. Lesson observations and interviews confirmed some degrees of misalignment in the adjuncts’ conception of SCI with characteristics described in the literature. Partial implementation with missing critical features of pedagogy was similarly observed by other researchers (Polly & Hannafin; 2011; Turpen & Finkelstein; 2009).

The needs assessment findings also revealed challenges in depending on SCI count and self-reported SCI implementation as a measure due to the ambiguity associated in the definition
of each strategy. Due to limited lesson observation and interview data, the conclusion on the extent of SCI implementation may not be generalizable.

Departmental norms, teacher self-efficacy, strengthening of pedagogical conception relating to constructivist perspective, and alignment of PD effort with professional learning preferences of adjuncts have been shown to potentially affect adjunct instructional decision making. In the next chapter, I will review the literature for a possible intervention to address these factors.
Chapter 3

Relying only on lecture-based teaching in the undergraduate classrooms is inadequate for the preparation of college students for the 21st century workforce (Cho, Caleon & Kapur, 2015; Kamei, Cook, Puthucheary & Starmer, 2012; Wismath, 2013). Despite evidence linking student-centered instruction (SCI) strategies to desirable learning outcomes (Cornelius-White, 2007; Kuh, Kinzie, Schuh & Whitt, 2011), lecturing remains the default pedagogy in higher education teaching (Smith & Valentine, 2012; Weimer, 2013). Similar practices are observed in SPEI where over 90% of the curriculum is delivered by adjunct faculty (SPEI, 2015).

Evidence from the needs assessment as well as literature review revealed the reciprocal influence of environmental and personal factors in shaping adjunct faculty members' instructional practice. Brief findings from the needs assessment are:

- The lecture method is implemented by 94.4% of the respondents ($n = 90$);
- Forty-three percent of the respondents indicated that they are aware of six out of the twelve SCI strategies but did not implement them in the classroom;
- Expectations from peers and department heads on the use of SCI are positively associated with the number of SCI strategies adopted ($rs [89] = .41, p < .01$) demonstrating the influence of departmental norms on instructional decision making;
- Adjuncts with high teaching self-efficacy utilize a higher number of different SCI strategies although the correlation is weak ($rs (88) = .41, p < .01$);
- Adjuncts' overall measure of student-centered conception did not result in statistically significant association with the number of SCI strategies adopted; $rs (85) = .17, p = .11$; and
• The top three most frequently used professional learning strategies are: problem solving (63.9%), making sense of change (61.2%), and online research (54.9%).

Synthesis of Intervention Literature - An Overview

The development of an intervention to promote the shift from lecture-based teaching to SCI requires considerations for the individual characteristics of the adjuncts as well as the context in which they are situated (Kezar & Sam, 2011, 2013). Roger's (2003) model of the innovation-decision process provides a framework to trace the instructional decision-making process of adjunct faculty as they consider the ideas before opting to integrate them in the lessons. The stages of the decision-making process will be examined through the lenses of socio-cultural and socio-cognitive theories in order to build connections between needs assessment findings and the proposed intervention.

Literature on the characteristics of effective PD focusing on learning in communities informs the design of the intervention. Additionally, research on virtual PD and mobile technology offers insights into the key tenets of online community development and flexible access to instructional support. Figure 3.1 below shows the literature review framework based on Rogers' innovation-decision process overlaying with various themes associated with the intervention.
Figure 3.1. The Innovation-decision framework. Adapted from *Diffusion of Innovations* (p.170), by E.M. Rogers, 2003, New York, NY: The Free Press.

**The Innovation-decision Process**

Meta-analysis of peer-reviewed research by Smith (2002) revealed the widespread use of Rogers' (2003) diffusion of innovation model as a lens to understand university faculty members' decision-making process as well as to support the propagation of new ideas in institutions of higher learning. The framework has been used to inform the development of a faculty training program on a new course management system (Bennett & Bennet, 2003), evaluate the effectiveness of virtual communities (McKenna, Johnson, Yoder, Guerra, & Pimmel, 2016), identify implementation guidelines for mobile device integration into curriculum (Doyle, Garrett, & Currie, 2013), trace faculty decision-making stages in using student-centered approaches (Lund & Stains, 2015), define criteria for faculty-developed learning repository (Lewis & Slapak-Barski, 2014), examine the antecedents of e-learning strategy adoption, and others (see review by Smith, 2012). Given the established research applications in higher education and focus on individual decision making, Rogers' innovation-decision model provides a logical interpretative framework to connect my needs assessment data and literature search of potential interventions for the promotion of SCI in my professional context. Additionally, the model
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describes the "individual-optional innovation-decisions" (Rogers, 2003, p.22) process, which reflects the voluntary nature of student-centered practices (i.e., instructional autonomy) among higher education faculty, given the absence of an institutional mandate.

According to Rogers' model, an individual progresses through five stages of the decision-making process before achieving sustained adoption: 1) knowledge, when the individual becomes aware of the innovation; 2) persuasion, when the individual evaluates the idea and forms a positive or negative opinion; 3) decision, when the individual makes a decision to accept or reject the innovation; 4) implementation, when the individual puts the idea into action; and 5) confirmation, when the individual assimilates the idea or reverses the decision for continued practice. Prior conditions including contextual and personal variables described in Chapter 1 may affect the level of innovation exposure of individuals. Rogers also suggests five attributes of innovation that may influence the individual's advancement from the persuasion to the decision stage: relative advantage, compatibility, complexity, trialability, and observability. These characteristics are likely evaluation criteria that faculty ponder when confronted with a new pedagogy (Bennett & Bennett, 2003; Blumberg, 2016; Lund & Stains, 2015).

Based on needs assessment evidence and the innovation-decision process elements stated above I seek to identify which decision-making stage in which SPEI adjunct faculty are likely situated as part of my intervention study. A review of literature provides insights on possible interventions of decision making that move people across the various phases of decision making towards the confirmation stage. Research on pedagogical intervention with successful outcomes in higher education has been linked to the recognition of faculty agency and identity, along with the value of social and informal learning (Korthagen, 2016; Saroyan & Trigwell, 2015; Steinert et al., 2016). Therefore, the focus of my review is based on known characteristics of effective PD anchored on the foundations of social cognitive and sociocultural learning theories.
The social cognitive learning perspective highlights the reciprocal interaction of personal thought, environment, and behavior during learning (Bandura, 1986). Social cognitive theory considers the mental processes of individuals as a mediating factor between environmental triggers and behavioral change. While the environment may influence thought and behavior, human cognition shapes the behavioral outcomes, which in turn can impact both the environment and the cognitive process. In this regard, learning occurs not only through direct experience but also by observing others. Observational learning pertains to the ability for individuals to learn vicariously by paying attention to other people’s actions and the consequences of these actions. Within the context of PD, the opportunity for vicarious experience may lead to adjustment in thoughts and behaviors, which potentially accelerates the learning process instead of having to directly perform the learning tasks.

In sociocultural theory, Vygotsky (1978) posited that learning is facilitated by interaction with a more capable peer within the zone of proximal development (ZPD), which he defined as the distance between the actual and prospective developmental level of mental operations. It is within the ZPD that learning is operationalized through language, tool use, as well as social interactions, which stimulates the development of higher mental functions. According to sociocultural learning theory, human reasoning is contextual and shaped by their engagement in the activity at the moment. Cognitive activities are also socially distributed and may be enhanced by application of tools (Resnick, 1987). Therefore, the development of competency is situated, grounded in the interdependency of tool, activity and culture (Brown, Collins and Duguid, 1989). In the next section, I discuss how PD features that embrace the dimensions of social cognitive and sociocultural perspectives have been linked to instructional transformation.
Professional Development as a Channel to Facilitate the Innovation-decision Process

Extant literature in the K-12 context illuminates key features for successful teacher PD. A review of 10-years of publications in Teaching and Teacher Education by Avalos (2011) revealed recurring themes associated with the social cognitive and sociocultural learning perspectives in models of teacher PD. Besides personal factors such as pedagogical beliefs and teaching self-efficacy, there is a growing recognition that teacher change is predicated upon institutional support systems and shaped by the mutually interacting forces of individual characteristics and the social environment. In the investigation of processes underlying teacher change and professional growth, Clarke and Hollingsworth (2002) proposed that change may occur in any or all of the domains related to the professional world of teachers: personal domain (i.e., knowledge, beliefs, and attitude), professional experimentation which may include classroom practice, inferred consequences of actions, and external source of information. Change in one domain is translated to another through two mediating processes, termed as “enaction” and reflection by the researchers. “Enaction” encompasses the notion of a teacher embracing newly developed beliefs along with increased instructional experimentation. Both enaction and reflection processes contribute to teacher change, however, the pathway of change is non-linear.

With the understanding of the change mechanism, it is reasonable that effective PD incorporates conditions that facilitate teachers’ reflection and enaction across these domains. PD that includes collaborative learning and opportunities for teachers to socialize their practice within a community of peers have brought about instructional reform (Darling-Hammond, Hyler, Gardner, 2017). Peer interaction can be a source of external information as teachers work collaboratively to make sense, adapt, and refine classroom strategies to elevate their practice (Desimone & Hill, 2017). This process contributes to Clarke and Hollingsworth’s (2002) notion
of salient outcomes characterized as the “teacher’s interpretive acts and the change phenomena that the teacher considered as salient” (p.957).

Instead of event-based PD that disseminates decontextualized pedagogical knowledge, PD that is job-embedded and grounded in actual problem solving allows teachers to situate their learning within the classroom and subject context (Daegen & Bean, 2014). Such PD features strengthen the connection between external sources of information and professional experimentation, which may prompt changes in the belief system as the teacher continuously evaluates the consequences of the experimentation. Positive experience generated from successful problem solving represents favorable inference to support long-term growth (Clarke & Hollingsworth, 2002).

Overlapping themes of effective PD are also observed in higher education. Driving change in pedagogical practices in the undergraduate classroom is typically carried out through activities known as educational development, faculty development, academic development, or PD (Saroyan & Trigwell, 2015; Stewart, 2014). While the terminologies differ, the general consensus on the features of such activities that result in positive outcomes include longer-term initiatives over single-session workshops. In a supportive social network, learning is embedded in daily academic activities with opportunities for reflective practice, peer validation, and institutionally-endorsed pedagogical experimentation (Rienties et al., 2013; Smith, 2012; Steinert et al., 2016; Stes et al., 2010). In this paper, I will use the term "professional development" (PD) to describe the proposed intervention.

Kember (2009) described a multi-pronged approach to promote SCI approaches in the University of Hong Kong. Based on the premise that faculty conceptions of teaching influence instructional strategies, which will eventually contribute to student outcomes, the researcher worked with 18 award-winning university teachers with exemplified SCI to develop a mandatory
PD course for junior faculty. Key features of the training program included open agenda meetings where SCI was discussed in response to classroom challenges that participants bring to the session, enactment of new techniques through role play, followed by experimentation in the form of well-timed group projects according to the participants' teaching schedules. The university also offered teaching development grants to fund 16 SCI projects. The effectiveness of the intervention was measured through SET comprising nine subscales of SCI indicators: active learning, teaching for understanding, feedback, assessment, cooperative learning, workload, coherence of curriculum, and relationship with other students. The researcher reported an increase in mean for all subscales of SET from 2005 to 2007 with a medium to large Cohen's effect sizes (d>0.5). The multi-pronged PD co-developed by the 18 award-winning faculty members were considered successful because of the significant increase of SETs.

The opportunity for participatory PD design and content contribution was also a key feature in successful programs supporting adjunct faculty (Banks, 2016; Hamilton, Fox & McEwan, 2013). Hamilton, Fox, and McEwan (2013) described the development of an adjunct faculty support framework in an Australian university, whereby senior adjuncts (known as sessional academic success advisors, or SASAs) with demonstrable pedagogical expertise were recruited to spearhead community engagement and academic development initiatives. Working together with the Associate Director of Sessional Academic Development of the university, the SASAs implemented a suite of "contextually specific, needs-based, peer-to-peer development opportunities" (p. 11), in the form of social events, virtual community, and production of discipline-specific resources. While the support framework was not specifically aimed to promote SCI, interview responses from two SASAs indicated that the experience enhanced their teaching practices and fostered pedagogical innovation. One of the components in the support framework included PD workshops to address “teaching and learning strategies that directly
affect the student experience” (p.16), which may be inferred as links to SCI. At the broader level, spontaneous social interactions among the adjunct participants led to regular focused discussion on improving student learning outcomes.

The initiative above includes the features of successful PD recommended by the literature, which are peer-led and community-based (Korthagen, 2016; Steinert et al., 2016), problem-driven, and job-embedded (Treleaven, Sykes & Ormiston, 2012). In the next sections, I explore evidences from the empirical studies on how the three supportive features of PD link to adjunct instructional decision across the innovation-decision stages of Rogers' model, with respect to strengthening teaching efficacy, changing conceptions of teaching and learning, normative expectations, and preferential learning behaviors - factors associated with my POP as determined in the needs assessment.

**Peer-led and community-based learning.** A community of practice (CoP) refers to a group of self-organizing individuals with common interests, who have formed a cohesive network as they develop their practice through regular interactions (Lave & Wenger, 1991). Through sustained mutual engagement, CoP members establish norms that define their practices, which may constitute a shared repertoire of resources, tools, routines, or symbols (Wenger, 1998). Wenger refers to the creation and use of these artifacts to shape practice as reification. A CoP is also characterized by a joint enterprise, or a shared domain, that members negotiate and commit themselves to. Based on the study of situated learning, learning within the CoP is associated with social participation where new members or novices go through a process of gradual engagement as they become familiar and eventually able to contribute to the practice. Termed as legitimate peripheral participation (Lave & Wenger, 1991), the acknowledgement of new members’ progressive involvement legitimizes their participation and identity in the CoP. The concept of CoP is represented in the characteristics of effective PD discussed in the
preceding section. These features include opportunities for teachers to access to models of practice and expert support, collaboration with peers (Darling-Hammond et al., 2017), and engagement in the process of reflection and enaction as teachers negotiate with changes in their personal and professional domains (Clarke & Hollingsworth, 2002).

In research involving virtual communities of practice (VCPs) comprising 83 engineering faculty members from 70 U.S. tertiary institutions, McKenna, Johnson, Yoder, Guerra, and Pimmel (2016) observed significant changes in participants' decision making across three stages of Roger's model: awareness (i.e. knowledge), attitude (i.e. persuasion), and adoption (i.e. confirmation) from fall to spring semester. The faculty members distributed themselves into four VCPs according to their subjects of interest and participated in regular virtual meetings with the aim of incorporating student-centered practices in their teaching. The size of each VCP ranged from 11 to 26 members and was facilitated by VCP leaders elected from faculty who were known for their evidence-based instructional practices. VCP members started with learning about different student-centered pedagogies, discussing issues encountered in student learning, and identifying appropriate strategies to address the concerns. This was followed by peer support in crafting implementation strategies and iterative refinements as faculty members tested the new approaches in the subsequent semester. In addition, VCP leaders facilitated weekly meetings via Adobe Connect while members interacted more closely in frequent break-out sessions within smaller subgroups to discuss specific topics. Between weekly virtual meetings, asynchronous sharing of recorded presentations, sample student assignments and supplementary resources from VCP leaders as well as between VCP participants were carried out. Participants were surveyed on their agreement on statements pertaining to their level of awareness, interest, and adoption of student-centered practices across three stages of VCP membership: before VCP began, midpoint after first semester, and at the end of the second semester after the VCP had concluded. Three
repeated measures of ANOVAs showed statistically significantly higher awareness levels at both midpoint and end of VCP than pre-VCP but stabilized between midpoint and end of VCP. On the other hand, faculty reported increasing levels in interest ratings from pre-VCP to midpoint, with further rising interest levels from midpoint to end of VCP. The effect of time yielded significant improvement in adoption levels from midpoint to end of VCP but not during the first two stages; the delayed effect was due to faculty implementation of the innovative strategies only after the midpoint measurement. To explore the underlying mechanism that links the initial growth in awareness and the continued increase in interest levels in the VCP environment, I refer to literature on teaching self-efficacy and conception of teaching.

From the socio-cognitive point of view (Bandura, 1997), the initial exposure to the different student-centered approaches from VCP leaders and the collective identification of appropriate strategy (McKenna et al., 2016) served as sources of positive persuasion that led to favorable views about the attributes of the instructional strategies (i.e., relative advantage, compatibility, complexity, trialability, and observability). Subsequent experimentations (i.e., mastery learning) and observations of successful implementation by peers (i.e., vicarious experience) further strengthened teaching self-efficacy, which moved the participants’ decision towards the implementation stage of Rogers’ model.

In my needs assessment, significant positive, albeit weak correlation, was observed between teaching self-efficacy and the number of SCI strategies adopted by adjuncts. Furthermore, 43% of the respondents indicated that they are aware of six out of the twelve SCI practices but did not implement them in the classroom. These data suggest that adjuncts are at the persuasion phase of the innovative-decision process. One possible reason that they have chosen not to adopt innovative approaches may be low efficacy and perceived negative attributes of SCI. Therefore, one way to increase likelihood of positive evaluations of SCI may be to
provide socialization opportunities with successful peers to facilitate verbal persuasion and observational learning (Bandura, 1986). Similarly, sociocultural perspectives highlight the transformation of inert knowledge into feasible knowledge representations, or affordances, when the content is disseminated by a peer expert in the community (Gee, 2008).

While enhancing teaching self-efficacy helps to alleviate perceived constraints (Hora, 2012), most university teachers, including adjuncts exhibit high self-efficacy pertaining to teaching tasks, although the efficacy measure does not specifically refer to SCI implementation (Fishback, Leslie, Peck & Dietz, 2015; Fives & Looney, 2009; Sharp, Hemmings, Kay, & Callinan, 2013). Strong personal efficacy in teaching may be due to a common expectation of acceptable teaching performance among higher education teachers where there is a general lack of pedagogical training and autonomous teaching practices (Fives & Looney, 2009). Given the high number of SCI strategies used per term reported in the needs assessment, it is likely that the adjuncts in SPEI perceived themselves to be already proficient in the practice of SCI.

The absence of correlation between SCI strategies and conception of teaching (i.e., ATI subscale) suggest a possible mismatch in the faculty understanding of SCI and the underlying constructivist principles. In other words, the adjuncts may perceive that their teaching methods are aligned with SCI, which explains the high number of SCI adoption, but their concept about the attributes and value of SCI in contributing to learning that embraced the constructivist principles may not be well established. Therefore, shifting conception may be necessary to foster greater interest for SCI adoption (Lee, Zhang, Song & Huang, 2013; Oleson & Hora, 2014; Prosser & Trigwell, 2013).

Changing the conception of teaching is complex and requires sustained PD efforts to facilitate reflection, collaborative learning, and iterative enhancement of practice within a supportive social network founded on principles of communities of practice (Flint, Zisook &
Fisher, 2011; Kensington-Miller, Yoon, Sneddon & Stewart, 2015). Opfer, Pedder, and Lavicza (2011) demonstrate in their structural equation model involving 1,126 teachers in England that the change sequence between teacher belief, professional learning, and instructional reform is not linear. This is contrary to the common notions that learning leads to conceptual change resulting in change in practice (Desimone, 2009) or that changed practice associated with positive student outcomes precedes belief transformation (Guskey, 2002). Consequently, teachers confronted with new ideas may traverse to and from the stages of Rogers' innovation-decision model especially when there are conflicting conceptions of teaching. The design of VCPs by McKenna and colleagues (2016) provided an interactional space bearing the hallmarks of communities of practice (CoP) characterized by a group of committed participants with common goals and collaboratively building a shared repertoire of practice (Wenger, 1998), potentially to cultivate student-oriented conceptions among the members.

**Informal and on-the-job learning.** Sustained PD participation appears to be pre-requisites for building efficacy and influencing conceptual change (de Vries, Jansen & van de Grift, 2013; Flint et al., 2011; Teras, 2014). While an online CoP provides a way for faculty members to access the community from a place of their convenience, scheduled activities and synchronous meetings commonly present in the online CoP or PD (e.g., McKenna et al., 2016 & Teras, 2014) offer limited flexibility because the online learning tasks require participants to commit time outside their work hours to engage in the learning.

Knight, Tait, and Yorke (2006) surveyed 2,401 U.K. Open University part-time tutors about how they learned to teach in higher education. The respondents reported that their experience as a teacher was the primary source of learning, followed by their own experience as students, and through informal conversations with colleagues and PD attendance. In terms of acquiring specific skills for their role, the top three learning experiences considered as highly
important and satisfying are staff development (77%), personal advice (69%), and reading resources produced by the Open University (66%). While formal PD is valued, this finding highlighted the dominance of on-the-job learning and social interactions characterized by personalization and choice. Consistent with other studies involving higher education faculty (Oleson & Hora, 2014; Van Schalkwyk, Leibowitz, Herman & Farmer, 2015) as well as the recommendations from professional learning researchers (Korthagen, 2016; Steinert et al., 2016; Webster-Wright, 2009), moving the learning process to the workplace with opportunities for reflection and meaningful conversations emphasizes in-situ skill acquisition over information accumulation. Accordingly, instead of focusing the PD effort at the knowledge stage of Rogers' model, SCI may be introduced through informal learning so that decision making may be triggered at any stage, particularly the implementation stage via workplace problem solving. Such encounters facilitate experiential learning with cyclical reflection and experimentation (Kolb, 1984).

With the persistent connectivity of mobile device users today, informal learning may be extended to the virtual space. Carpenter and Krutka (2014) reported survey data from 494 educator Twitter users, showing the top uses of the microblogging platform are resource sharing and acquisition (96%), collaboration (86%), networking (79%), and participation in Twitter chats (73%). Respondents also recounted positive experience arising from rapid responses to queries, recognition for idea contribution, and the development of trusted relationships. The situatedness of the Twitter conversation is similar to the exchanges commonly observed among teachers in the hallways, over meals, and getting personal advice from a knowledgeable peer. A ground-up approach to online social networking and microblogging may be less prevalent in institutions of higher learning, but there is evidence of online tool application such as Facebook, Wiki, and Youtube within the higher education community (for e.g., Cochrane, Antonczak, Keegan &
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Narayan, 2014; Hamilton et al., 2015). This study’s needs assessment showed that 68.9% and 50% of the SPEI adjunct respondents used their mobile devices to share digital content and surf social media. Positive emotional engagement derived from having their contributions legitimatized by the community as well as the opportunity for joint intellectual development, facilitate meaning making and strengthen teaching self-efficacy (Bickerstaff & Cormier, 2015; Resnick, 1987; Thomson, 2015).

Although informal chats over the web or in-person have the potential to engender SCI teaching conception, build confidence, and offer great satisfaction to participants, the direction and content of the conversation may remain superficial, or even dismissive with limited collaborative instances and student-oriented themes (Kearney & Maher, 2013, Thomson, 2015). For example, Brit and Paulus (2016) observed five weekly Twitter chats among educators and identified one topic relating to shifting from teacher-centric to student-centric lessons, while the rest of the four topics focused on educator concerns such as the debate on school provision of one device for every student and teacher dropout. Without a unifying problem to tackle, random socialization experience may yield limited professional growth. The next section explores the role of problem solving in changing instructional practice.

**Learning as problem solving.** One of the critical features of effective professional learning is social interaction anchored in a problem of practice (e.g., Kember, 2009; McKenna, 2016). Kensington-Miller et al. (2015) traced the thinking and instructional behavior of a mathematics professor teaching a large undergraduate lecture from 2009 to 2011. The professor worked in a CoP comprising the researchers and five other mathematics educators on a problem of practice, which is to explore ways to incorporate student-centered elements in the predominantly lecture-based course. To this end, the group decided to modify the current lecture delivery style by getting students to work interactively on a mathematical question once every
lesson. Team members designed and iteratively assessed the effectiveness of the questions in eliciting students' conceptual understanding of mathematics as they applied the techniques in the classroom.

The researchers gathered data from interviews, reflection journal, and classroom observations to examine the trajectory of the professor's espoused and enacted belief about SCI as he went through collaborative sense making and repeated experimentation. Initially the professor struggled with the questioning technique as the new way of teaching challenged his initial belief system about his role as an expert and the function of questions. Eventually he came to value conceptual questioning over procedural ones and shifted from primarily didactic instructions to facilitating small group discussion among the students.

This study provides evidence that the existence of a central task (i.e., explore ways to incorporate student-centered elements) served as a driving force to foster continuous learning by the professor to refine his questioning techniques. Other examples of PD, which included a problem of practice, have also reported positive outcomes. For example, a project to jointly develop a faculty toolbox on educational technology became the problem of practice that elevated the technical proficiency of community members (Lewis & Slapak-Barski, 2014). Similarly, when the discussion in a learning community provided opportunities for faculty to link classroom needs to service learning, faculty buy-in for integrating service learning into the curriculum was enhanced (Furco & Moely, 2012). Incorporating a problem-solving element that is relevant to the classroom context as part of the PD feature aligns well with my needs assessment findings since the adjuncts in SPEI had indicated that problem solving is the second most frequently used professional learning strategy.

Informal learning may occur subconsciously as adjuncts encounter problems in the classroom. However, routine practices may place them in their comfort zone and are unlikely to
stimulate significant professional growth (Teras, 2014). One way to harness the power of informal learning is to problematize the workplace by encouraging processes such as reflection, self-paced reading, and assumption challenging conversations (Blumberg, 2016; Knight et al., 2006). These activities create intentionality in the informal learning experience resulting in more readiness for critical examination of one's practice. Against this backdrop, I propose the mobile space as a potential environment to cultivate meaningful academic socialization that stimulate informal learning while addressing a shared problem of practice for busy adjuncts.

**Mobile Learning**

Given the nascent application of mobile technology in learning, there is a plethora of perspectives surrounding the definition and scope of mobile learning (Traxler, 2013). Sharples, Taylor, and Vavoula (2007) defined mobile learning as “the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies” (p. 227). Instead of focusing on either the mobile technology or the learner, Sharples and colleagues framed their definition to embrace the duality of the mobile learning ecosystem as a communicative interaction between technology and learner. These attributes of mobile learning are illuminated in the empirical studies summarized below.

Although learning on a hand-held device may share similar features with computer-based online PD, researchers have found statistically significant differences in the quality and frequency of asynchronous discussion between mobile and traditional e-learning environment (Lan, Tsai, Yang & Hung, 2012). Content analysis of forum posts from undergraduate students in a Taiwanese university indicated higher levels of meaning negotiation and co-construction of knowledge among mobile device users, while the discussion patterns in the control group focused on information sharing. Furthermore, the mobile learning group was able to associate their learning with daily experience, which was evident in their media-rich presentation in the
final assessment task, resulting in higher scores than the computer users. Enhanced meaning negotiation afforded by mobile technology replicates the informal conversations and collective sense-making process, which have been shown to support teachers in contextualizing their learning particularly when confronted with unfamiliar pedagogy or ambiguous requirements (Allen & Penuel, 2015; Bickerstaff & Cornier, 2015; Thomson, 2015).

The opportunity for curricular discussion and collaborative development of instructional tools has been empirically demonstrated to increase pedagogical knowledge and successful implementation of innovative teaching strategies (Allen & Penuel, 2015; Pape et al., 2015). Mobile technology provides an avenue for users to readily extend their learning to the immediate surrounding through the generation of artifacts. Consistent with the findings by Lan et al. (2012), Kearney and Maher (2013) reported that teachers who were given mobile devices as part of their pre-service training captured observations of mathematics concepts in the real world and discussed the use of these images with peers in a lesson planning activity. Such learning behavior aligns with Brown, Collins, & Duguid's (1989) perspective of situated learning and the notion of knowledge as a tool. In this case, the mobile device becomes a learning tool that creates a different form of representation for teaching mathematics and new ways of interactions.

In addition to the unique affordances offered by mobile learning, PD features identified as effective, such as CoP, informal learning opportunity, and problem-oriented learning may be integrated. Mobile learning provides a space for different points of entry in the innovation-decision model. Through serendipitous learning and strategic mobile notifications to trigger critical reflection (Tabuenca, Kalz, Ternier & Specht, 2015), focused discussion may germinate leading to substantial intellectual discourse or action-oriented collaboration (Hamilton et al., 2013; Treleaven et al., 2012). Consequently, members at the periphery of the social interactions may be drawn to participate through scaffolded conversations or success stories (Lave &
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Wenger, 1991), thus potentially nudging them towards a more advanced stage of the innovation-decision process. Over time, normative expectation for student-centered practices may be established as a result of the vibrant discussion and shared knowledge representations among like-minded members.

The affordances of mobile technology are many, but the past decade of research has shown that the delivery of mobile learning has focused only on the mobility of the device instead of the learner and replicated traditional computer-based online learning design principles for digital content dissemination via smaller mobile screens (Dennen & Hao, 2014; Laurillard, 2007). Some of the mobile learning environment has placed additional cognitive demands on users resulting in inefficient learning (Chu, 2014; van Merriënboer, Kirschner & Kester, 2010). To avoid such pitfalls, in the next section, I will provide literature support to delineate the pedagogical affordances of mobile technology to inform the selection of a mobile-based CoP (mCoP) environment, as well as the instructional design approaches to technology-mediated learning to align with the recommended attributes of transformative PD.

**Pedagogical affordances of mobile learning.** Online learning has evolved from teacher-centered design to learner-oriented approaches with the advent of ubiquitous web fueled by increasing processing power of personal computers and handheld devices. Like online learning theories, multiple perspectives drawn from the fields of the psychology, linguistic, teaching and learning, communication, design, and culture contribute to the development of mobile learning theories.

With mobile learning, the notion of personalization is accentuated. This is because mobile technology provides an additional affordance that enables its users, be it students, adult learners, or the general public, who are constantly on the move to switch between the physical, social, and virtual spaces as they engage in a plethora of activities using their handheld devices.
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(Taylor et al., 2006). For example, a learner could be travelling on a bus and text chatting with a group of friends in the mobile space. When the bus passes by an interesting landmark, the learner may use the phone camera to take a picture and share it with the chat group. Further information about the landmark may be acquired as the learner browses through various websites and even make enquiries on online forums. The learner may wish to offer the new insights discovered to the chat group or have a face-to-face conversation with a travelling companion while referring to the web information presented in the mobile device (Frohberg, Goth & Schwabe, 2009; Park, 2011).

While acknowledging faculty agency in navigating their own professional learning is desirable (Seo & Han, 2013), an accountability mechanism is necessary to incentivize participation as well as to ensure alignment of learning outcomes with institutional goals. Self-paced learning devoid of social interactions may offer the highest level of autonomy that could well be the learning preference of some adjuncts, but community-based learning and goal-oriented discourse have been shown to engender great satisfaction and transformative outcomes (Cochrane et al., 2014; Furco & Moely, 2012; Kember, 2009). Therefore, the mobile learning environment should be embedded with the flexibility to represent such dialectical relationships, so that different learning needs and interests can be met with reasonable institutional oversight. In view of the needed balance for autonomy and control, I will apply Taylor et al.'s (2006) task model approach to mobile learning to inform the design of mobile learning environment.

Components of the task model. Taylor et al. (2006) presents the idea that learners move across two spaces, the technological space and semiotic space, when engaging in mobile learning—as depicted in Figure 3.2 below. Technological space refers to the tool interface and device functionalities that the user interacts with, while the semiotic space consists of the mental space or learning environment in which the learner experiences and participates. These two layers are
interdependent and exert reciprocal influences on each other. An individual (labeled as “Subject” in Figure 3.2) is both a technology user and a learner who moves across the two spaces. The learner may choose a technology appropriate for learning and integrate it into the task. This action possibly shapes the way the technology is used; however, technology also changes the learner’s perception and performance in the learning environment (labeled as “Tool” in Figure 3.2 where technology and learn-space are interwoven). The “Object” component in the model shows the goal that the learner wishes to accomplish upon participation in the task. In the technological domain, the aim is access to information. From the human and social (i.e. semiotic) perspective, the learner seeks knowledge and skills.

The lower part of the triangle represents three influencing factors (context, control, and communication) critical for eliciting pedagogical value in a mobile learning environment. “Control” describes the agentic power that the learner can exercise in the learning process. Constraints may be imposed by social rules or instructor-paced activities (in the semiotic space), as well as limitations in human-computer interactions (in the technological space). A full learner control scenario occurs when learners assume all the responsibilities for goal setting and task choice, have freedom to participate in the learning process across time and space, and the options to use preferred or multiple device features.

Although the “Context” dimension holds many interpretations (Jalil, Beer & Crowther, 2015), it generally refers to the situatedness of the learning experience. Context sensitive mobile learning invites the learner to interact with the physical or social environment for task accomplishment. For example, students on a field trip capture multimedia information on historical landmarks or stories of indigenous community and generate annotations for online discussion. On the other hand, an activity that only focuses the learner’s attention to the virtual space such as watching Youtube videos or answering online quizzes without gathering data unique to the current surrounding is context independent (Frohberg & Schwabe, 2009).

The “Communication” node represents the communication infrastructure (in the technology space) that facilitates individual reflection or multi-way conversations (in the semiotic space). Depending on the extent of social interactions, functionalities such as note taking, instant messaging, or video-conferencing may be integrated in the mobile learning environment to realize self-paced or community-based learning. With a multitude of evidence pointing to benefits of collaborative learning (Hamilton, Fox & McEwan, 2013; Kember, 2009; McKenna et al., 2016; Steinert et al., 2016), the “communication” aspect of the task model
guides the design consideration to match intended learning interactions with corresponding forms or platforms of communication.

The task model represents one of the many ways of realizing the pedagogical features of mobile learning. Overlaps for the three influencing factors are observed in other frameworks such as the community of inquiry (CoI) model (Garrison, Anderson & Archer, 2000) and the m-learning pedagogical framework (Kearney, Schuck, Burden, & Aubusson, 2012). For example, “control” resembles CoI’s “teacher presence” and Kearney’s “personalization” construct. However, Taylor et al.’s (2006) task model clarifies the duality of the technology and learning spaces yet emphasizes the interconnectedness and complexity of the relationship between each component (Frohberg & Schwabe, 2009; Jalil et al., 2015). This offers a helpful lens to guide the selection of the mobile learning environment in the intervention. The two studies below highlight the attributes of the task model and offer suggestions for effective features of mobile learning.

Ranieri, Manca, and Fini (2012) examined the group mechanism and online behaviors of 1,107 teachers across five Facebook groups. The founders of each group indicated that Facebook was the chosen platform because it offers instantaneous communication and space for resource sharing as well as the ease of reaching out to a large number of people. More than 60% of the members gave reasons for joining that included to keep updated on group topics, exchange information, and share ideas and projects. A chi-square test showed that participants in the thematic group (i.e., group discussion focused on a distinctive theme) were more motivated to receive updates about group topics, while those in the generic group (i.e., group discussion related to general school topics) joined because they wanted to share ideas and projects. Despite the differences in motivation for reading and posting between the two groups, the findings imply that information retrieval and contribution, via a repository of shared resources or the collective knowledge of the network are the most frequent actions in the online environment. In this
respect, the optimization of the “communication” and “control” dimension of the task model is critical to support the users’ actions.

One way to provide optimum support to users’ action is to consider the usability design factors that influence online and reading and contributing behaviors (Preece and Shneiderman, 2009; Table 3.1). These usability factors describe specific design elements that are likely to facilitate the realization of the “communication” and “control” dimensions in Taylor et al. (2006). From the perspective of an online reader, usability refers to the ease of discovery or retrieval of content of interest (i.e., users have a sense of control when browsing content). Within a user-generated content space such as a social networking site or Wikipedia, frequently updated content is key to promote repeat visits. However, it is critical to consider achieving optimal engagement without overwhelming the readers. Therefore, tagging functions and search capabilities are essential to manage the flow of new information (i.e., different options to engage with content characterized by the communication dimension). With regards to the interactions associated with online contributors, usability not only involves the flexibility of posting formats (i.e., users control their preferred content types) but also the attachment of visibility features to the contributor’s content. Recognition given to prolific contributors in the form of view frequencies and comment ratings potentially motivate higher quantity and quality contributions (i.e., multiway communication with others and the text).
Table 3.1

Usability factors for reading and contributing (Preece & Shneiderman, 2009)

<table>
<thead>
<tr>
<th>Reading</th>
<th>Contributing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-organized and interesting content</td>
<td>Low threshold for making small contribution (e.g., no login or persistent login)</td>
</tr>
<tr>
<td>Feature content with frequent updates</td>
<td>High ceiling features for large and frequent contributions (e.g., large input field, drafts, versioning)</td>
</tr>
<tr>
<td>FAQ and quick support for newcomers</td>
<td>Visibility for users' contribution and frequency of views</td>
</tr>
<tr>
<td>Clear navigation</td>
<td>Visibility of ratings and comments</td>
</tr>
<tr>
<td>Universal access to support wide range of user groups (display size, bandwidth limit, multilingual and disability support)</td>
<td>Tools to undo vandalism and limit malicious users</td>
</tr>
<tr>
<td>Multiple information retrieval features: reading, browsing, searching, sharing, tagging, downloading</td>
<td></td>
</tr>
</tbody>
</table>

A significant feature of mobile learning is the possibility for users to switch between the physical and virtual space in their learning engagement. Kearney and Maher (2013) documented how pre-service mathematic teachers used iPads to support their teaching role and their own learning. The teachers used the camera and annotation functions in iPads to capture physical objects that they came across in everyday living to illustrate mathematics concepts during lessons. They also collected evidence of student learning through video and audio recording, which aided their post lesson critical reflection. The in situ and seamless interfacing of the user's physical encounters with the online environment is prominent in activities such as Geocaching, where users locate hidden items using GPS based on social postings of coordinates in the internet (Jones, Scanlon & Clough, 2013); context-aware devices in museums, that provide visitors information about the exhibits (Frohberg, Goth & Schwabe, 2009; Sharples, Taylor & Vavoula, 2004); and portfolio or artifact development by students as they capture digital recording of
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objects during field trips (Ranieri & Pachler, 2014). These studies highlight the unique affordances of mobile learning to support the blending of physical, social, and virtual environment to generate rich and context-sensitive information for learning. Because learners were able to extend their interaction across both the material and virtual spaces, they participated more frequently in online forum discussion and demonstrated higher levels of knowledge construction process as compared with those who learn in a traditional online mode using laptops or desktop computers, (Lan, Tsai, Yang & Hung, 2012).

**Optimum design features of mobile learning.** The studies above suggest the value of context sensitive features in the mobile learning environment for active application of the software. In other words, an optimum mobile learning environment may be realized if the following features are present (Frohberg et al., 2009 & Taylor et al., 2006):

- sensitivity to the learning context: the opportunity for learners to integrate relevant content from their physical and social environment into the mobile learning context, and vice versa;
- high levels of control for learning: choices in activity types, learning pace, depth and breadth of social interactions, and learning objectives; and
- versatile communication: different forms of conversation and expression of ideas (i.e., text, audio, visual, in synchronous and asynchronous modes) as well as a range of collaborative relationships from isolation to teamwork.

Based on a systematic review of mobile learning research publications from 2001 to 2014, Jalil et al. (2015) recommended twelve functionalities to be embedded in a mobile application, in order to fulfill the pedagogical requirements illustrated by the task model. Examples from the twelve components include note, picture, video, audio, chat, map, and
internet browser. Their proposal to use multiple device features for mobile learning is consistent with other studies that showed learners relying on several external applications outside of the primary mobile learning platform to complete their learning tasks (Gu, Churchill & Lu, 2014; Ranieri & Pachler, 2014). Such integration is commonly known as "in-app" navigation, which allows users to access third party application without leaving the primary virtual platform (Jalil, Beer & Crowther, 2015).

Given the convergence of findings that favor context dependency, high level of learner control, flexible communication, and multiple tool use associated with mobile learning, it can be concluded that a mobile-based content delivery system that curates relevant information may fulfill the self-paced learning environment preferred by the adjuncts. At the same time, links to the device camera, note taking functions, as well as social learning opportunities situated in the workplace context are important features to enrich the learning interactions. In this regard, possible options for the intervention may be an in-house developed mobile application populated with bite-size multimedia content on SCI strategies along with a social networking software such as Workplace @ Facebook.

Choosing the right mobile environment alone is unlikely to automatically engender transformative behaviors desirable in this intervention. A well facilitated community-based learning environment is key to directing social interactions towards goal-oriented discussions. In the next section, I explore the strategies to implement mobile learning with the aim of fostering community-based learning.

**Supportive structures of mobile learning community of practice (mCoP).** Learning in a community of practice (CoP) has been shown to foster the diffusion of student-centered practices (McKenna et al., 2016). Depending on the level of activities in a CoP, increasing community interaction, particularly among new members, may be associated with changing
beliefs and instructional shifts (Daly, Moolenaar, Bolivar & Burke, 201). As discussed in the previous section, Wenger (1998) posits that social learning in a CoP is characterized by the interplay between participation and reification. The learning trajectories of newcomers to the CoP can be traced according to their increasing participation and contribution of cultural artifacts (Nistor & Fisher, 2012). Wenger accorded five qualitative categories to the learning trajectories (p.154): peripheral (i.e., having access to the CoP but making minimal contribution), inbound (i.e., initially at the periphery but showing evidence of increasing contribution to and identification with CoP), insider (i.e., actively contributing to the CoP with objectives to refine own practice and support the learning of others), boundary (i.e., being involved in more than one CoP and linking practices across communities), and outbound (i.e., leaving the CoP to take up membership in another). Since focus of this intervention is on changes in participation level within a single mCoP, only the peripheral, inbound, and insider trajectories are applicable. The analogous levels of participation in an online scenario may be represented by Preece and Shneiderman's (2009) Reader-to-Leader framework:

- reader (peripheral trajectory) – new members who are browsing and reviewing post to get acquainted with the mCoP;
- contributor (inbound trajectory) – members who have started to identify themselves with the group and begin to post their thoughts or share resources; and
- collaborator and leader (insider trajectory) – core members including the mCoP facilitators, who create opportunities for collaboration or influence the direction of the activities.

Growth in mCoP participation is dependent on the level of rapport and the perception of value derived for continued involvement (Harasim, 2012).
**Social and emotional connection.** Using hierarchical linear modeling, Eberle and Fischer (2014) identified four factors that predict newcomer participation level in a CoP. They are: accessibility of community knowledge, CoP size, exposure time, and recruitment activities. Accessibility of community knowledge, defined by the authors as the extent to which the CoP collects and disseminates relevant information to newcomers in an organized manner, suggests the importance of content presentation. Newcomers still in the peripheral trajectory (i.e., readers) may continue to access the mCoP if there are frequent updates, active discussion among core members, and clear navigation to FAQs and tutorials (Preece & Shneiderman, 2009).

In similar veins, longer participation in a CoP established with fewer members allows more frequent interactions and provides opportunities for newcomers to take up responsibilities in easy tasks (i.e., contributor status demonstrating inbound trajectory; Eberle & Fisher, 2014). Extending this argument for the effective implementation of mCoP, mCoP facilitators and core members play a critical role in establishing a safe and encouraging social presence with persistent online visibility. Additionally, mCoP leaders need to affirm the contribution of newcomers and pave the way for them to build their online reputation through meaningful task engagement (Preece & Shneiderman, 2009) such as joint development of lesson plans for dissemination in the mCoP.

On the other hand, Eberle and Fischer (2014) reported negative impact on existing newcomer participation level for recruitment activities, which constituted offering short-term tasks for prospective CoP members as a means of introducing them to the CoP without further commitment. While the authors did not discuss the reasons for this observation, they alluded to the prerequisite of certain legitimization process before advanced membership activities are endorsed. Literature on community participation indicates that sustainability of a CoP is strengthened with the presence of regular committed members (Harasim, 2012) and prior
friendship or interactions outside the CoP (Cho, Gay, Davidson & Ingraffea, 2007; Pan et al., 2015). Members who were given elevated status in the CoP before garnering trust may be perceived as an "intruder" and adversely interfere the group dynamics. This study suggests that socio-emotional factors remain one of the strongest influencers in members' willingness for knowledge exchange.

**Intellectual engagement.** In addition to positive social and emotional connections, growth in CoP participation is also characterized by graduated levels of intellectual engagement. Harasim (2012) offers a useful lens to examine the progression of knowledge building: idea generating, idea organizing, and intellectual convergence. Cross-case analysis of four online CoPs involving school teachers revealed dialogs that exemplified these stages, for example (Vavasseur & Gregor, 2008):

- idea generating, messages that introduce new ideas or encourage generation of multiple perspectives - "If you have any great ideas for vocabulary graphic organizers or lessons on grammar, please share!" (p.528);

- idea organizing, messages that link ideas and make references to related comments - "I remember you telling me about this the other day. Is there a tutorial on blogger.com that gives detailed instructions on how to tie your account to students? …Thank you for all you’ve done for me - I appreciate you greatly!" (p.529); and

- intellectual convergence, messages that summarize or feature a production of an artefact - "Technology involvement has become essential…We can do interviews online with people we’d never meet, research surveys and polls done by large numbers and turn surveys into graphs with the push of a button. Life is sweet." (p.528).
Consistent with the literature related to the characteristics of a CoP (Lave & Wenger, 1991; Wenger, 1998), knowledge is generated when members interact with one another as well as participate in the development of artifacts. Engagement in a social context facilitates the process of meaning-making through ongoing negotiation of identity and cultural practice. Consequently, continued dialogues and critical reflection among members represent dynamic expressions of a CoP undergoing a growth trajectory (Wenger, 2012).

**Instructional Design for Mobile Learning**

The discussion in the preceding sections articulated PD as a vehicle to support innovation decision making and advocated key tenets of mCoP in establishing the supportive structures for instructional change. While principles drawn from traditional face-to-face or online community of practice (Wenger, 1998; Harasim, 2012), computer-supported collaborative learning (Preece & Schneiderman, 2009; Salmon, 2011), and pedagogical affordances of mobile learning (Taylor et al., 2006) provide the grounding for the development and facilitation of the mCoP. The following paragraphs provide the content solutions for SCI as well as the strategies for message design and instructional sequencing for efficient and purposeful learning.

**Content for developing student-centered instruction.** Since SCI does not constitute any definitive teaching methods, the procedural adherence to a known strategy without the correct understanding of the underpinning theories is likely to diminish the intended benefits (Chen, 2008; Lund & Stains, 2015). On the other hand, possessing pedagogical knowledge, about the constituents and value of SCI, does not necessarily translate to effective application (Blumberg, 2009). Therefore, it is necessary for the mCoP participants to not only discuss SCI techniques (e.g., small group discussion, real-time polling, or concept maps), but also to reflect on ways SCI may lead to positive student outcomes such as getting students to assume
responsibilities for their own learning and promote learning through meaning construction (Bransford et al, 2000; Weimer, 2013).

Blumberg (2009) developed a comprehensive system to support higher education faculty in transforming their teaching towards SCI based on Weimer’s (2013) five dimensions of teaching: the function of content, the role of instructor, the responsibility for learning, the purposes and processes of assessment, and the balance of power. She identified 29 components across the five dimensions with clear links to instructor behavior. Recognizing that changing from teacher-centered to SCI is not a dichotomous transition but a gradual transformation of instructional practices over time, Blumberg added four incremental steps to each component with corresponding qualitative or quantitative representations of learner-centered levels. The transitionary stages in the learner-centered continuum are: (1) instructor-centered approaches, (2) lower level of transitioning to learner-centered approaches, (3) higher level of transitioning to learner-centered approaches, and (4) learner-centered approaches.

As part of the comprehensive system to guide faculty to transform their teaching towards SCI, Blumberg (2009) suggested the following steps (p. 67):

1. Assess the level of SCI for a course against the rubrics
2. Provide rationale for the assigned SCI status
3. Describe the desired change
4. Determine the target level of transformation
5. Assess the obstacles to and feasibility for transformation
6. Develop an action plan based on the “Planning for Transformation exercise” form
The six steps serve as a foundation for faculty to apply the rubrics to plan for SCI. Figure 3.3 below shows a brief definition of the teaching dimensions and a sample of the Blumberg’s (2009) rubrics.

<table>
<thead>
<tr>
<th>Component</th>
<th>Instructor-centered</th>
<th>Lower level of transitioning</th>
<th>Higher level of transitioning</th>
<th>Learner-centered approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level to which students engage in content</td>
<td>Instructor allows students to memorize content</td>
<td>Instructor provides content to students. Students learn the material without transforming or reflecting on it</td>
<td>Instructor assists students to transform and reflect some of the content to make meaning out of it</td>
<td>Instructor encourages students to transform and make their own meaning out of most content</td>
</tr>
</tbody>
</table>

*Figure 3.3. SCI component for content engagement. Adapted from Developing learner-centered teaching: A practical guide for faculty (p.75), by P. Blumberg, 2009, San Francisco, CA: Jossey-Bass.*

As Blumberg (2009) intended for the components to be independent of one another, faculty members may assess the prevalence of learner-centeredness in their courses in one or multiple teaching dimensions, or target a single or combination of components, to begin their instructional transformation. Components that are found to be inconsistent with the school policy may be excluded for assessment (Blumberg, 2011; von der Heidt & Quazi, 2013).

Although the rubrics provide the means for scoring each component, which may be applied for benchmarking of SCI implementation at the course or institutional level (von der Heidt & Quazi, 2013), there is presently no study to verify the consistency between analysis score and actual implementation (Blumberg & Pontiggia, 2011). This is evident in the varying interpretations of several components due to limited familiarity with pedagogical terms, erroneous assumptions about the constituents of SCI, and ambiguity arising from the nature of the course yielding potentially unrepresentative information. For example, faculty members tend to believe that constantly reminding students of assignment deadlines is indicative of them
getting students to take responsibility for learning. However, the repeated reminders may have a reverse effect (Blumberg, 2016).

In this regard, formative use of the tool, with the opportunity for peer assessment or discussion about the course status on the SCI continuum, may be more beneficial. For example, in an institutional assessment of SCI implementation (Blumberg, 2016), 58 faculty were interviewed using a questionnaire developed from the Blumberg’s rubrics. While the investigation sought to collect data on the extent of SCI, the participants reported that the interview process itself gave them the opportunity to think about ways to implement SCI based on the descriptors in the rubrics. The researcher also reported that the rubric-based interview represented a PD vehicle to reach out to faculty members who seldom attend teaching-related workshops.

Besides potentially serving as an initial self-assessment tool to trigger critical reflection and problem solving, Blumberg rubrics provide the vocabulary for mCoP members to discuss the qualitative distinction of SCI at different levels. Additionally, the components within each teaching dimension suggest flexible starting points for faculty to embark on their SCI transformation journey. They may choose low risk or high impact components, adopting one or many components, depending on their readiness and course context (Blumberg, 2009). Such provision of options recognizes the importance of faculty agency advocated in PD literature (Saroyan & Trigwell, 2015; Treleaven et al., 2012; Webster-Wright, 2009), which is also evident in Blumberg’s intention when she stated, “Each step of the rubrics explains what instructors can do to make their courses more learner-centered; the instructor’s perspective is the focus throughout.” (p. 25).

Based on the discussion above, Blumberg’s rubrics appear to be an appropriate tool as the content component for structuring mCoP conversations pertaining to SCI. Blumberg’s (2009)
rubrics were validated by over 250 college instructors from various disciplines and faculty developers as well as in literature reviews. This implies that the system is applicable for mCoP members from different subject areas. Furthermore, this system was recently introduced to equip college graduates with lifelong learning skills in the globalized world, thus aligning to the problem that this study hopes to address.

The rubrics provided concrete guidance to operationalize SCI transformation in a face-to-face setting as well as self-paced learning (Blumberg, 2009). However, the one-on-one faculty consultation sessions and in-person workshops suggested by Blumberg may have limited reach and sustainability, given the intensive resources required to provide personalized support. Using an mCoP to disseminate the practice promises widespread yet adaptable application. In order to ensure that the scaffolding provided in the one-on-one consultation can be realized in the mCoP environment, I examined the instructional design literature to inform the organization and delivery of the content and activities.

**Instructional components in the mCoP.** One of the reasons for the limited adoption of student-centered instruction (SCI) is the complexity inherent in the facilitation process. Unlike the lecture style delivery where faculty members pace their teaching according to the course syllabus, SCI requires that faculty members relinquish some degree of control to students. In this regard, there is a greater sense of uncertainty associated with the relatively unscripted lesson and faculty members have to adapt their teaching according to the students’ responses (Blumberg, 2009). In addition to disciplinary knowledge, faculty members are expected to be proficient with the various SCI procedures, be familiar with the diverse student characteristics, and possess a working knowledge of learning theories to effectively integrate multiple dimensions of teaching for successful SCI implementation (Blumberg, 2016; Moos & Pitton, 2014). Therefore, there is likely inadequate cognitive capacity for faculty members new to SCI to make instantaneous and
accurate classroom decisions if the various SCI dimensions are not readily retrieved via
automatic processing in their mental schema (Feldon, 2007). Previous sections hinted to these
issues with accounts of partial SCI implementation (Lund & Stains, 2015), reverting from SCI to
lectures (Bakkenes, Vermunt & Wubbels, 2010), and transfer failure from PD to the classroom
environment (Chen, 2008).

While Blumberg’s rubrics provide the necessary content to focus the mCoP interaction,
open-ended discussion on the application of all the 29 components of the rubrics is likely to
overwhelm mCoP participants. Given the short content interaction time recommended for mobile
learning (Churchill & Hedberh, 2008), it is imperative to chunk the instructions in ways that
alleviate cognitive demands yet maintain a holistic understanding of SCI for effective transfer to
daily practice. In the next sections, I describe the whole task approach to instructional design, the
mechanism for sequencing the content to establish scaffolding, and conclude with a proposed
instructional design framework.

**Designing for effective transfer.** The needs assessment, as well as evidence from faculty
professional learning, emphasizes the necessity for work-embedded problem solving (Treleaven
et al., 2012; Webster-Wright, 2009). In this regard, Merrill’s (2002) problem-centered and whole
task approach to designing instructions are compatible with the learning preferences of the
adjunct faculty. Merrill (2002) asserted that instructional programs that promote learning transfer
share common design principles that are prescriptive and applicable across different delivery
systems. Termed as “First Principles of Instructions”, Merrill suggests effective learning transfer
happens when the learners are presented with a problem and engaged in four instructional
phases: activation of prior knowledge, demonstration of the new knowledge to the learner,
application of new knowledge, and integration of the knowledge in the real world. These
components bear the characteristics of effective professional learning advocated by literature,
such as learning by problem solving, positive persuasion through successful demonstration, and opportunity for experimentation (Korthagen, 2016; McKenna et al., 2016; Steinert et al., 2016; Treleaven, Sykes & Ormiston, 2012).

The design elements, while not explicitly referred to as First Principles of Instructions, are evident in the PD described in the preceding section. For example, Kember’s (2009) multi-pronged initiative to institutionalize SCI was anchored on common issues encountered by faculty (i.e., problem-centered). Award-winning faculty facilitated group activities, which include open discussion, expert exemplars, role play, peer demonstration of SCI techniques, and development of disciplinary-specific SCI materials for contextualized application. The series of activities mimicked the four instructional phases proposed by Merrill. Similarly, McKenna and colleagues (2016) structured their virtual community of practice with targeted content aligned with the needs of the faculty (i.e., problem-centered), involved expert faculty to relate pedagogy with subject knowledge (i.e., activation phase) and to model SCI techniques (i.e., demonstration phase), provided opportunities for participants to formulate SCI techniques (i.e., application phase), and to implement them in the classroom (i.e., integration phase).

Merrill’s First Principles of Instruction help to conceptualize SCI transformation as a whole task and inform the progressive dissemination of learning activities to facilitate completion of increasingly complex tasks through activation, demonstration, application, and integration of knowledge. Exposing learners to the whole task, characterized by authentic problem solving is advantageous for transfer of learning to the daily context. However, the internal representation of knowledge structures associated with real-world problems is often incomplete for novices, potentially causing exhaustion to the learners’ cognitive capacity and undermining the learning experience (van Merrienboer, Kirschner & Kester, 2010). Furthermore, harnessing the affordances of mobile learning equates to facilitating learners’ access to and
interaction with the content while on the move (Sharples et al., 2007). Extraneous load arising from the moving physical surrounding and limitations of small screen display may impose additional distractions to the learning process (Churchill & Hedberg, 2008; Wang & Shen, 2012). Accordingly, appropriate scaffolding and mobile message design are critical to manage cognitive load.

Cognitive load theory (CLT) suggests that there is a limited amount of working memory for effortful practice (Sweller, 1994). Timely provision of an optimum amount and the type of support, therefore, are necessary to help learners as they attempt to resolve a complex learning task. Such support is compatible with the concept scaffolding proposed by learning theorists (Vygotsky, 1978), enabling learners to focus only on specific task elements intended for skill acquisition without overloading their mental capacity. It is also critical that the level of scaffolding corresponds to the learners’ ability for task completion because too little or too much support is detrimental for learning (Sweller, 1994).

In the context of mCoP, scaffolding may be realized in the form of knowledgeable others (Lave & Wenger, 1991) and representational resources in mobile devices (for e.g., Google search and phone camera) as described earlier (Brown et al., 1989). However, a loosely structured collaborative environment as well as poor design of mobile learning experience may cause reallocation of cognitive resources (known as extraneous load) toward tasks not directly relevant to the learning objectives (Feldon, 2007; Levine & Marcus, 2010). Hence, additional scaffolding with careful design of instructional features in the mCoP is necessary to minimize extraneous load. Based on CLT and an extension from Merrill’s problem-centered instructions, van Merrienboer et al. (2010) recommended a four-component instructional design (4C/1D) model to manage cognitive load associated with complex learning, namely: learning tasks, supportive
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information, procedural information, and part-task practice. The following paragraphs give brief description for each component.

Learning tasks may be described as a series of authentic tasks presented to learners ranging from simple-to-complex versions of a whole task. These tasks can be designed with a limited number of ill-defined variables or less coordination as compared to what is required in real-world problem solving. By progressively controlling the complexity, a fading support system is created for learners to begin by attempting to solve worked-out examples (extensive support), followed by problem solving with partial solutions (intermediate support), and finally working on a conventional problem unaided.

Supportive information usually represents some generalized knowledge that may be built into the long-term memory for subsequent retrieval during task performance. While this information supports the performance and reasoning of the learning tasks, it can be complex and may be relevant only for non-routine tasks. van Merrienboer et al. (2010) suggests delivering supportive information to learners prior to problem solving to prevent cognitive overload. In the context of this study, the individual SCI strategies such as small group discussion, real-time polling, and concept maps represent the supportive information that may be adapted across different lessons.

Procedural information is the prerequisite skills for performing recurring tasks during problem solving. It is domain specific and typically characterized by rules or facts necessary for routine practices. Strengthening of cognitive schema pertaining to procedural information is critical to achieve automaticity. Therefore, it is recommended that this information is presented just in time throughout the problem-solving experience. However, gradual removal of this information is necessary as learners grow in expertise.
Part-task practice is important when the constituent skills are highly complex and there is insufficient opportunity for learners to develop automatic schema during whole task performance. Nevertheless, provision of part-task practice is only beneficial after learners are exposed to whole task problem solving. Piecemeal instructions may lead to challenges in holistic integration of sub skills to tackle future problem situations.

**Content presentation in mobile devices.** Besides hierarchical sequencing to scaffold complex learning tasks so that adequate working memory is available for task completion, there is also a need to minimize potential extraneous load arising from the limited mobile display area and the constant mobility of learners. A comparative study (Parmigiani & Giusto, 2016) between two groups of pre-service teachers using smartphones and tablets revealed that both types of mobile devices promote interaction and quick retrieval of information through search functions. However, pairwise comparisons showed the use of tablets in the teacher education program has resulted in significantly higher scores in cooperation patterns, interest level during lectures, perceived changes in studying habits, and increased awareness in own learning styles as compared to smartphone applications. Qualitative data indicated that the small screen size in smartphones prevented extensive reading and modification of digital materials. One of the participants reported feeling distracted accessing the mind maps in her smartphone as she had to constantly zoom in to enlarge the view.

In addition to screen size effects, mobile learning activities that impose frequent switching between the physical and virtual space may also have negative effects. Elementary students who participated in a mobile-based formative assessment in a field trip achieved lower post-test scores as compared to the teacher-guided group (Chu, 2014). Using Sweller’s (1988) cognitive load survey, the researcher concluded that the level of challenge of the formative assessment task matched with the students’ capability as both groups reported similar mental
effort in resolving the questions. In contrast, the experimental group expended significantly higher cognitive resources than the control group in attending to the interacting elements required for task completion. The frequent and repeated mobile learning prompts exerted some pressures on the students to work through the tasks hurriedly, hence overloading their working memory and resulted in less thorough observations that might have impaired their posttest achievement.

The findings above echo van Merrienboer et al.’s (2010) sentiments about problematic designs that negatively affect learning outcomes due to misdirected learners’ cognitive resources to irrelevant tasks. Although there is a dearth of empirical evidence on mobile learning message design (Molnar, 2016; Wang & Shen, 2012), user anecdotes and case studies highlighted several design recommendations. For example, analysis of interview responses from ten educational professionals across several institutions in Hong Kong (Churchill & Hedberg, 2008) identified eight preferential features for mobile learning object development: full screen presentation, landscape orientation, minimum scrolling, short and task-focused interactions, one click access, zooming capability, and permitting stylus pen interaction. Other researchers also offered similar recommendations such as keeping video duration to under five minutes (Shen, Wang, Gao, Novak & Tang, 2009), using visual or audio presentation instead of text (Gedik, Hanci-Karademirci, Kursun & Cagiltay, 2012), and avoiding lengthy text inputs (Wang & Shen, 2012).

These design recommendations serve as useful reference points in the interface development of an mCoP as well as the resource selection to facilitate easy access and short reading time. Likewise, the expected contribution in the reflection activities and discussion responses can be maintained as informal chats characterized by short text messages to minimize the burden of typing. One way to ensure alignment with user preferences is to adopt widely accepted platforms with known features for intuitive navigation or make use of industry
standards in the development of mobile application (for e.g., HTML5, REST, and PhoneGap; Mesfin, Gronli, Ghinea, 2016; Pawar, 2014).

**Intervention Design to Support SCI Implementation Through mCoP**

Overlaying the SCI instructional component and the mCoP features on Taylor et al.’s (2006) task model provides an illustration on how each dimension contributes to the intervention (Figure 3.4). As described in the previous section, the “Tool” node of the task model represents the learning space as well as the technological space where users concurrently retrieve information and engage in the learning process. Adjuncts gain access to the learning opportunity through their mobile device (i.e., “Tool”), and the instructional component facilitates the information seeking and learning experience through this node. Blumberg’s (2016) rubrics trigger the cognitive dissonance to position SCI infusion as a problem-solving task and mark the learning journey with concrete yet attainable goals. By adopting the First Principles of Instruction (Merill, 2002) and the four-component instructional design (4C/1D) (van Merrienboer et al., 2010) approach to sequencing instructional tasks described in the previous section, additional scaffolding is offered to reinforce the procedural techniques for critical examination of teaching practices, while creating opportunities for small successes for efficacy building. Exposure to worked examples related to the rationale for SCI infusion and modelling of SCI implementation may unveil gaps in teaching conception.

The delivery of the instructional content will be mediated by the three nodes at the base of the task model. These dimensions may be encapsulated in the design of the mCoP interactions. A community of practice (Wenger, 1998, 2002) is characterized by self-organizing group members who have a joint enterprise (in this context, SCI infusion) and shared repertoire (i.e., Blumberg’s rubrics and a working knowledge of various SCI strategies), are committed to mutual engagement, and facilitate progressive participation among members at different stages
of instructional change. Accordingly, the notion of mCoP seems promising to explicate the control, context, and communication dimensions of the task model to harness the pedagogical affordances of mobile technology.


Building upon the ideas and definitions proposed in the task model (Frohberg & Schwabe, 2009; Taylor et al., 2006), the conceptualization of this mCoP sought to balance a planned instructional sequence with loosely structured social interactions so that members experience a high degree of control over their own learning, are given opportunities to augment their learning through contextual interactions and enjoy flexible forms of communication. Such arrangement is likely to be palatable for adjuncts based on findings in the needs assessment,
which is also empirically affirmed in various studies (Carpenter and Krutka, 2014; Houghton et al., 2015). More importantly, an mCoP has the potential to situate SCI infusion in informal workplace conversations, enabling sustained purposeful interactions and social persuasion, which have been found to be prerequisites to shifting teaching conception as well as enhancing teaching efficacy (Bandura, 1997; Fives & Looney, 2009; Kensington-Miller, Yoon, Sneddon & Stewart, 2015; Knight, Tait & Yoke, 2006; Van Schalkwyk, Leibowitz, Herman & Farmer, 2015).

While the Workplace-based mCoP membership will be opened perpetually, I intend to collect the data for the study during the first eight weeks. Although the recommended PD duration is between 12 weeks to a year (Cochrane & Narayan, 2013; Hamilton et al., 2013; Postareff, Lindblom-Ylanne & Nevgi, 2007), there is evidence of skill acquisition and attitudinal change after eight weeks of online PD or mCoP immersion (McKenna et al., 2016; Rienties et al., 2013). Depending on the extent of rapport from established friendships and the reciprocity of engagement, online course persistence among adult learners are generally lower than regular students (Deschacht & Goeman, 2015), with declining access and forum participation starting from the second to the fourth week (Gillani & Eynon, 2014; Henderson, 2007). Furthermore, longer course commitment may deter sufficient levels of participation for meaningful analysis of the study.

Mobile learning offers the possibility of embedding known features of transformative PD. Although time and space flexibility afforded by the mobile technology appears to be a straightforward solution to provide on-demand PD to promote SCI implementation, design considerations with respect to the facilitation of community-based learning and the presentation of the instructional content have significant implication on the PD outcomes.
Chapter 4

Needs assessment data revealed more than 40% of the adjunct faculty respondents are aware of multiple SCI strategies but continue to rely on lectures for their teaching. Teaching self-efficacy and gaps in conceptions of teaching about instructional practices aligned with constructivist practices are two of the factors associated with limited adoption of SCI. Additionally, there appears to be a mismatch between the current mode of in-person PD workshops and the adjunct faculty members preferred professional learning strategies. Likewise, adjuncts’ limited time spent on campus and their precarious employment status may constrain PD participation and opportunity for pedagogical knowledge application (Kezar, 2013). To support the innovation-decision process (Rogers, 2003) from awareness to implementation of SCI, I proposed a mobile learning community of practice (mCoP) intervention to address the treatable conditions delineated above.

Research Questions

In view of the complex dynamics associated with the faculty decision-making process, simple causal links between independent variables of the intervention and adoption of SCI are unlikely (Oleson & Hora, 2014). Therefore, this research used a mixed method design to evaluate the effectiveness of mobile learning PD by collecting a combination of quantitative and qualitative data for a complete understanding of the outcomes of the intervention (Creswell & Plano Clark, 2011). Furthermore, the nature of this investigation was both confirmatory (e.g., to conclude positive effects of strengthening teaching self-efficacy to changing practice) and exploratory (e.g., to develop practices and experiences associated with mobile learning). Accordingly, one of the aims of this study is to make inferences from the data analysis to reveal emerging themes as well as draw conclusions about the processes and outcomes of the intervention.
Following the recommendations of Onwuegbuzie and Leech (2006) in writing mixed methods research questions that are compatible with the underlying paradigms of quantitative and qualitative research design, the following research questions evaluate the effectiveness of the intervention and describe the process by which the mCoP supports the shift in the adjuncts’ innovation-decision stages according to Rogers’ (2003) framework:

- **RQ1:** How has the implementation of the mCoP achieved program fidelity?
  a. Did the mCoP delivery adhere to Taylor et al.’s (2006) task model approach to mobile learning?
  b. Did the mCoP members’ responsiveness to the program reflect Wenger’s learning trajectory?

- **RQ2:** How does participation in mobile learning PD influence adjunct faculty progression in Rogers (2003) innovation-decision stages with respect to implementing SCI?
  a. Has mCoP participation increased SCI awareness?
  b. How has mCoP participation influenced the adjunct faculty attitude, in terms of their teaching self-efficacy and teaching conception towards SCI?
  c. How has mCoP participation increased self-reported SCI implementation?

- **RQ3:** What are the participants’ experiences with and without the mCoP?
  a. What features of the mobile learning with and without the mCoP facilitate the advancement of adjunct decision making towards SCI implementation?
  b. In what ways are the quantity and quality of participation different between the groups with and without mCoP?

In the next sections, I delineate the theory of treatment to present the hypothesized correlation between the intervention variables and the expected outcomes to realize the above inquiry.
Research Design

Embracing Leviton and Lipsey’s (2007) recommendation to “describe what goes on inside the black box between treatment inputs and outputs” (p. 56), the following paragraphs outline the theory of treatment to inform the research design. This section focuses on the description of the targeted population and conditions this study sought to address, along with the inputs and treatment strengths. The underlying theory of the transformation process and the expected outcomes provide the grounding for the design of the process and outcome evaluation, respectively.

Theory of Treatment

While instructional decisions are influenced by a multitude of factors, the treatable conditions for this study are mismatched teaching conceptions with instructional practices that align with constructivism, teaching self-efficacy for SCI, and PD opportunities that are responsive to adjuncts’ learning needs. Studies have shown the positive impact of PD in transforming teaching practices through faculty conceptual change and enhancing teaching self-efficacy (Flint, Zisook & Fisher, 2011; Kensington-Miller et al., 2015). Additionally, adjuncts face travel challenge given their multi-campus teaching commitments and experience loss in opportunity cost when they give up hourly paid lesson delivery to attend in-person PD (Kezar, 2013), therefore flexible access to learning across time and space dimensions, in the form of informal conversations in the mobile environment, not only aligns well with adjuncts’ work demands, but also potentially offer greater satisfaction (Carpenter & Krutka, 2014). Because of the adjuncts’ short-term work contracts, it is necessary to ensure the participants recruited for the study will have continuous teaching assignments and given some degree of pedagogical flexibility to facilitate SCI experimentation. Another boundary condition is to work only with adjuncts who are ready to transition from using mobile devices for personal applications to
professional learning purposes to minimize extraneous variance in the experiment (Shadish, Cook & Campbell, 2002). Features of mobile learning arising from adjuncts’ lack of familiarity with the software configuration and navigation or inability to assess the compatibility of the mobile application with their device operating system may hinder access to the mCoP (Veletsianos, Kimmons, & French, 2013). These extraneous factors of the experimental setting may distract participants from enjoying the intended mCoP experience hence compromise the ability to make accurate statistical inference about the treatment effects (i.e., statistical conclusion validity). The adjuncts’ teaching contracts, permission for SCI experimentations, and comfort level with mobile applications set the boundary conditions for the recruitment of participants in this study. Any spurious effects including attrition and differential mCoP involvement will be documented and analyzed. Details on the recruitment of the adjuncts for the research will be elaborated in the Procedure section of this chapter.

**Specification of inputs.** To maximize the learning potential from virtual conversations, a goal-oriented environment embedded with appropriate levels of learner-facilitator-content interactions (Anderson, 2008) is necessary. However, there is also a need to acknowledge faculty agency in PD (Korthagen, 2016; Saroyan & Trigwell, 2015; Steinert et al., 2016). To this end, the intervention was characterized by high transactional distance and socialized mobile learning activity (Moore & Kearsley, 2011; Park, 2011) where there was less facilitator involvement and where learners work in virtual groups on their own accord guided by rules of activity or preprogrammed content in the mobile space. Participatory development of PD and peer-led community-based learning are critical for contextualizing inert pedagogical content to practical knowledge (Kember, 2008; McKenna et al., 2016), in addition to prompting vicarious learning and social persuasion for the enhancement of teaching self-efficacy (Bandura, 1997). To fulfill
the mobile learning conditions stated above, high quality facilitation and instructional design were imperative.

*Facilitation strategies.* Supportive structures within a CoP contribute to increased participation as well as progressive knowledge building (Chen et al., 2010; Eberle, Karsten, & Fischer, 2014). Accordingly, mCoP facilitation strategies that balance both the socio-emotional connection and intellectual engagement among members are desirable (Guldberg & Mackness, 2009; Harasim, 2012; Nistor, 2015). The mCoP facilitator created an emotionally positive environment for newcomers to feel accepted in the group, participate in specific tasks, gain affirmation for their contribution, and develop confidence in taking more responsibilities in the mCoP (Preece & Schneideman, 2009). In addition to establishing a positive social and emotional connection, progressive intellectual engagement is critical to sustain the perception of value for continued mCoP involvement. Facilitation strategies that foster incremental knowledge building were drawn from Harasim’s (2012) collaborative learning processes where the mCoP leader worked to steer group conversations to promote idea generation and organization, culminating in intellectual convergence.

*Instructional design.* Besides facilitation strategies, mobile content development aligned with the instructional design framework proposed in Chapter Three is important to leverage the unique affordances of mobile learning. A working knowledge of the reciprocal effects of learning theories, delivery medium, and cultural practices of mobile users in shaping online learning behavior (Anderson, 2008; Garrison, 2000, & Lowyck, 2014) is key to designing the micro courses and mCoP activities. Following the instructional design framework discussed earlier, the development of the learning content in the mobile environment was informed by Blumberg’s (2009) system for SCI infusion and the 4C/1D simple to complex learning approach (van Merrienboer et al., 2010). Blumberg’s rubric for assessing the extent of SCI in a higher
MOBILE LEARNING FOR ADJUNCT FACULTY

education course provided the content to develop the learning tasks. Each learning activity was structured as a problem-focused whole task with opportunities for activation, demonstration, application, and integration of knowledge (Merrill, 2002), while the instructional sequence followed van Merrienboer et al.’s (2010) 4C/ID approach of gradually diminishing scaffolding to support cognitive load management of mCoP participants.

**Treatment strength.** An in-house mobile application, STELLAR, delivered micro courses in the form of short readings of curated web content and video snippets of SCI exemplars in the SPEI context. For the mCoP, the Workplace social platform (an enterprise version of Facebook) provided a closed group interaction. While the micro courses were disseminated to the entire SPEI adjunct population, the formation of the mobile chat group followed Lave and Wenger's (1991) postulation of community of practice, which aimed to "realize in the lived-in world of engagement in everyday activity" (p. 47). The mCoP facilitator initiated the group creation; however, peer invitation and individual requests to group membership were encouraged to allow for the organic growth of the mCoP. Given the rolling enrollment to the mCoP as well as the individual differences in the interaction levels characterized by Wenger’s (1998) learning trajectories, the within-group variances in mCoP participation may yield differential effects on the SCI teaching self-efficacy and teaching conceptions across individual member. Accordingly, the heterogeneous social and learning interaction levels among the participants represented a range of treatment strengths for the analysis of the relationship between mCoP participation and intervention effects. The differences in social interactions were characterized by the progressive participation responsiveness over the intervention period, while participants’ enrollment in the micro course may be indicative of the levels of learning engagement. Detailed measure of the treatment strength will be discussed in the Methods section of this chapter.
The transformation process. The quantity and quality of participation in the community may influence the mCoP outcomes (Renninger et al., 2011). Applying the lenses of learning trajectories suggested by Wenger (2010) helps in tracing the path that mCoP members take throughout the intervention. The types of trajectories relevant to this study include: (a) peripheral, have access to the community but do not progress to full membership; (b) inbound, newcomers who may initially be at the peripheral but show prospects of full identification with the group; and (c) insider, typically includes the core members who started the group and demonstrate ongoing refinement of their craft.

Since the mCoP space is accessible only via mobile devices, the extent to which mobile technological affordances are aligned with how adjuncts learn is likely to mediate the quality of community of practice experience (Hutchison, Tin & Cao, 2008). The needs assessment data revealed adjuncts preferred to learn through sense-making, doing online research, and problem solving. These learning preferences are compatible with and may be realized by Taylor et al.’s (2006) task model as described in Chapter Three.

Based on the discussion above, the mCoP was implemented in a manner that the participation and instructional design approach were realized according to the tenets of sociocultural learning perspective and the task model of mobile learning respectively. Therefore, the process evaluation focused on two aspects of implementation fidelity, participant responsiveness and adherence to the mobile learning design features.

Participant responsiveness. The ideal participation level over the course of the intervention was characterized by growth in the quantity and quality of participation in the mCoP (Preece & Shneiderman, 2009; Wenger, 1998). While each mCoP member was expected to exhibit unequal levels of advancement in the participation dimensions, I expected mCop interaction to reflect Wengers’ learning trajectory. Hence, high fidelity of implementation was
considered when all members participated in the activities and demonstrated such growth trajectory.

**Adherence to task model.** As mentioned in the Taylor et al.’s (2006) task model previously, the ideal mobile learning experience allows participants to extend their learning from the virtual into the physical or social realms (i.e., context), offers full autonomy for learning (i.e., control), and facilitates multiway communication or collaboration (i.e., communication). To evaluate how much the mCoP instructional design adheres to the task model, participants were invited to share their experience in a focus group. High fidelity was attributed when participant’s perception aligned with the influencing factors of the task model (i.e., context, control, and communication). The measures for participant responsiveness and adherence to task model are discussed in the “Method” section.

**Specification of expected outputs.** As explained in Chapter Three, given the need to balance declining potential participation due to perception of lengthy commitment and requirements for adequate mCoP immersion to enable skill acquisition, data collection for this study was limited to the first eight weeks of the program. Virtual CoPs that brought about lasting conceptual change and improved practice are typically three to twelve months long (Cochrane & Narayan, 2013; Doyle, Garrett & Currie, 2014; McKenna et al., 2016). Therefore, I considered only the proximal outcomes including pre- and post-intervention differences in Rogers’ (2003) innovation decision stages, characterized by changes in SCI awareness, attitude toward SCI, and self-reported SCI implementation. In the outcomes evaluation, the measure for the progression in the innovation-decision stages is discussed in the Method section.

Besides the proximal outcomes, stochastic factors such as the probability of discontinued adjunct appointment and curriculum restriction that may interfere with the intervention outcomes. The impact of student evaluation on teaching (SET) may also be a deterrent for
pedagogical experimentation. I was also mindful of implementation issues such as termination of mobile application, service disruptions, and skill variances in mCoP facilitation. To maintain treatment integrity (Dusenbury, Brannigan, Falco & Hansen, 2003), I collected chat logs, periodic screenshots of mobile application, and focus group transcripts to assess participant responsiveness as part of process evaluation plan.

**Method**

A mixed methods approach was chosen for this intervention study because instructional decision making is complex (Oleson & Hora, 2014) and a single type of data is unlikely able to capture a complete understanding of the observed effects (Creswell & Plano Clark, 2011). Moreover, the design of the mCoP is adapted from empirical studies on successful features of in-person and traditional online PD, as well as synthesis of literature on mobile learning, such as sustained learning interactions instead of episodic workshops (de Vries et al., 2013; Hamilton et al., 2013), opportunity for community-based inquiry (Kember, 2009; McKenna et al., 2016), and acknowledgement of faculty agency (Webster-Wright, 2009), so multiple operationalization of the constructs of interest is necessary for instrument fidelity and to strengthen internal validity (Collins, Onwuegbuzie, & Sutton, 2006; Shadish et al., 2002). Therefore, both quantitative and qualitative data collection is necessary to reveal unknown variables arising from new ways of social interactions not found in standard CoP as well as to improve generalizability of the findings (Collins et al., 2006; Creswell & Plano, 2011). This study also reflected a convergent parallel design to collect and analyze both the quantitative and qualitative data separately. The results from both sources were used to interpret the adjuncts’ progression in the innovation-decision stages. This approach helped to ensure treatment integrity by accounting for discrepancies between the planned and actual intervention (Collins et al., 2006).
While the primary objective of the intervention was to support SCI implementation, mobile learning holds promise to a cost-effective solution for adjunct faculty PD in my organization as compared to the present face-to-face workshops with low attendance. Therefore, the outcome of this research had the potential to provide multiple realities to address stakeholders’ interests not only for instructional change towards SCI, but also justification for continued funding. The convergent design puts equal emphasis on both the quantitative and qualitative strands (Creswell & Plano, 2011). By embracing a pluralistic stance, practicality can be achieved for both the policy makers in the institution and the adjuncts who are the beneficiaries of this initiative.

Participants

There are over 300 adjunct faculty members in SPEI. However, the actual number of adjuncts who are deployed for teaching vary from term to term. Given the multiple universities that SPEI partners with, the adjuncts may also be teaching across curriculum with different academic calendars. A total of 24 and 25 adjunct faculty members participated in the comparison and treatment group, respectively. All the participants were asked to go through five SCI micro courses in the STELLAR mobile application as part of the intervention study, however only 15 from the comparison group and 14 from the treatment accessed all five SCI online contents. Since the quantitative analysis for Rogers’ (2003) innovation decision process included only participants who have completed the five SCI micro courses, Tables 4.1 to 4.4 show the demographic profiles of all participants in the initial groups as well as the subset to be considered for analysis in RQ2.

The treatment group included members with a wide range of teaching experience, from less than two years to above 15 years while every participant in the comparison group had taught for at least six years (Table 4.1). Nevertheless, the majority of participants in both groups have...
either taught between six to ten years or over 15 years. Both groups’ members responded most frequently that they chose a part-time teaching career because it fits their current lifestyle (Table 4.2). However, more participants in the treatment group reported that they have a full-time profession outside academia and are waiting for an available full-time position. In terms of class size and assessment structure, the comparison group has slightly more members teaching larger classes as well as teaching a more examination-focused curriculum (Tables 4.3 & 4.4). Chi-square tests of independence confirmed that there are no relationships between the grouping and the various demographics variables and assessment structures.

Table 4.1

*Years of teaching experience*

<table>
<thead>
<tr>
<th>Participant group</th>
<th>Comparison n (%)</th>
<th>Comparison - completed 5 SCI n (%)</th>
<th>Treatment n (%)</th>
<th>Treatment - completed 5 SCI n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 years</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (4.0)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>2 to 5 years</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (8.0)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>6 to 10 years</td>
<td>12 (50.0)</td>
<td>4 (26.7)</td>
<td>9 (36.0)</td>
<td>3 (21.4)</td>
</tr>
<tr>
<td>11 to 15 years</td>
<td>5 (20.8)</td>
<td>5 (33.3)</td>
<td>4 (16.0)</td>
<td>4 (28.6)</td>
</tr>
<tr>
<td>More than 15 years</td>
<td>7 (29.2)</td>
<td>6 (40.0)</td>
<td>9 (36.0)</td>
<td>5 (35.7)</td>
</tr>
<tr>
<td>N</td>
<td>24</td>
<td>15</td>
<td>25</td>
<td>14</td>
</tr>
</tbody>
</table>
Table 4.2

Reasons for choosing part-time teaching

<table>
<thead>
<tr>
<th>Participant group</th>
<th>Comparison</th>
<th>Comparison - completed 5 SCI</th>
<th>Treatment</th>
<th>Treatment - completed 5 SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part-time fits my current lifestyle</td>
<td>20</td>
<td>12</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>I have a full time professional career outside academia</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>I am waiting for an available full-time teaching position</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Part-time teaching is a stepping-stone to full time teaching</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Note. Participants may select more than one reason

Table 4.3

Class size

<table>
<thead>
<tr>
<th>Participant group</th>
<th>Comparison n (%)</th>
<th>Comparison - completed 5 SCI n (%)</th>
<th>Treatment n (%)</th>
<th>Treatment - completed 5 SCI n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20 students</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (8.0)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>21 to 40 students</td>
<td>3 (12.5)</td>
<td>3 (20.0)</td>
<td>6 (24.0)</td>
<td>4 (28.6)</td>
</tr>
<tr>
<td>41 to 80 students</td>
<td>7 (29.2)</td>
<td>4 (26.7)</td>
<td>5 (20.0)</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>81 to 120 students</td>
<td>10 (41.7)</td>
<td>5 (33.3)</td>
<td>8 (32.0)</td>
<td>4 (28.6)</td>
</tr>
<tr>
<td>More than 120 students</td>
<td>4 (16.7)</td>
<td>3 (20.0)</td>
<td>4 (16.0)</td>
<td>3 (21.4)</td>
</tr>
<tr>
<td>N</td>
<td>24</td>
<td>15</td>
<td>25</td>
<td>14</td>
</tr>
</tbody>
</table>
Table 4.4

Assessment structure

<table>
<thead>
<tr>
<th>Participant group</th>
<th>Comparison n (%)</th>
<th>Comparison - completed 5 SCI n (%)</th>
<th>Treatment n (%)</th>
<th>Treatment - completed 5 SCI n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% weighting in final exam</td>
<td>5 (20.8)</td>
<td>2 (13.3)</td>
<td>5 (20.0)</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>Combination with higher % weighting in final exam</td>
<td>8 (33.3)</td>
<td>6 (40.0)</td>
<td>8 (32.0)</td>
<td>5 (35.7)</td>
</tr>
<tr>
<td>50% examination, 50% continuous assessment</td>
<td>7 (29.2)</td>
<td>5 (33.3)</td>
<td>7 (28.0)</td>
<td>5 (35.7)</td>
</tr>
<tr>
<td>Combination with higher % continuous assessment</td>
<td>3 (12.5)</td>
<td>5 (33.3)</td>
<td>2 (8.0)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>100% continuous assessment</td>
<td>10 (4.2)</td>
<td>10 (6.7)</td>
<td>3 (12.0)</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>N</td>
<td>24</td>
<td>15</td>
<td>25</td>
<td>14</td>
</tr>
</tbody>
</table>

Measures

As delineated in the literature review, shifts in instructional decision making and classroom practices have been linked to sustained PD in the form of social learning and post-workshop support (Rienties et al., 2013; Smith, 2012; Steinert et al., 2016). To this end, the outcomes comparison between members who access the micro courses and those who experience both the micro courses and the mCoP was analyzed. The indicator for this binary variable is represented by the two groups of participants: comparison group (i.e., participants of micro courses only) and treatment group (i.e., participants of both micro courses and mCoP). I describe the measures for the process and outcomes variables in the next sections.

Fidelity of Implementation. The transformation process outlined two constructs that mediate the intervention effects, participant responsiveness and the adherence of the mCoP features to the task model. The process evaluation provides a way to assess implementation fidelity for making casual explanations (Nelson, Cordray, Hulleman, Darrow, & Sommer, 2012)
as well as controlling for alignment with the theory of treatment (Dusenbury et al., 2003). The next subsection describes the process indicators.

**Participant responsiveness.** Although there is no definite conceptualization of online participation, most researchers operationalize forms of participation in terms of quantitave measures, self-report of participants’ experience, and content analysis of online posts (Malinen, 2015). Consistent with the CoP dimensions reflected in my intervention approach, I adopted Wenger’s (1998) learning trajectories for the development of the measure for mCoP participation. The quantitative indicators for this measure included frequency of login post counts, number of enrolled micro courses, and frequency of artifact contribution, while the qualitative indicators were represented by participants’ chat content and online interactions (Appendix G). Three levels of participant responsiveness were expected in the mCoP: peripheral, inbound, and insider membership. Indicators for peripheral membership include viewing posts and writing brief comments. Inbound members were anticipated to respond to discussion prompts and post messages following the mCoP activities, whereas the insiders’ chat content was likely to show evidence of promoting participation among members, initiating collaboration, and contributing artifacts. The participation measures provide the data to evaluate implementation fidelity for the participant responsiveness dimension (Dusenbury et al., 2003).

**Adherence to the task model.** The design of the mCoP is adapted from Taylor et al.’s (2006) task model to realize the affordances of mobile learning. The extent of mCoP design adherence to the task model is represented by Frohberg et al.’s (2009) scaled indicators for the task model, namely context, control, and communication (Appendix H). Definitions of the three factors are included in Chapter Three. Example questions for the three factors are illustrated below.
Context. A context-relevant learning task requires the participants to engage with elements outside of the mobile application, either in the physical or social space to augment task accomplishment or problem solving. An example question is “How did you include information from the physical surrounding to complete the learning activities such as posting photos or videos taken from your physical location?” and “When you have queries about SCI or are faced with classroom challenges, how do you tap into the mCoP for support?”

Control. A key feature of mobile learning is to enable autonomy in the learning experience. Participants will be prompted to share specific occasions they felt they had full or little responsibility for learning, with questions such as “In what ways were the learning goals set for you?” and “What were some learning activities that you decided how and when to participate?”

Communication. Successful mobile learning provides options for multiway communication. Participants were invited to respond to questions such as “Who do you usually interact with in the mCoP?” and “Please describe your interaction patterns with an example.”

Outcomes Measure. The effectiveness of the intervention was evaluated in terms of the adjuncts’ advancement in Rogers’ (2003) innovation-decision stages (i.e., RQ2) and qualitative analysis of the participants’ experiences (i.e., RQ3). Shifts in the innovation-decision process are represented by indicators for SCI awareness, attitude toward SCI, and self-reported implementation levels of SCI.

Awareness and self-reported implementation indicators are referenced from several studies on student-centered teaching utilizing the Rogers (2003) diffusion of innovation framework (Henderson, Dancy, & Niewiadomska-Bugaj; 2012; Lund & Stains, 2015; McKenna et al., 2016). The questionnaire on faculty attitude about SCI is adapted from the Teacher’s Sense of Self-Efficacy (TSES) instructional strategy subscale (Tschannen-Moran & Hoy, 2001).
and Approaches to Teaching Inventory (ATI) subscales for student-centered and conceptual change (Prosser & Trigwell, 2006). Appendix I shows the questionnaire items that measured the adjuncts’ progression in the innovation-decision process.

**Awareness.** For each of the five SCI strategies (Appendix I, item 9), adjuncts were invited to choose from one of the following options: (1) I have never heard of it, (2) I have heard the name but do not know much else, (3) I am familiar but have not used it, (4) In the past, I have used all or part of it, but I am no longer using it, or (5) I currently use all or part of it. The SCI awareness score will be computed as the average of the five SCI.

**Attitude.** I use Tschannen-Moran and Hoy’s (2001) instructional strategies subscale from the Teachers’ Sense of Efficacy Scale (TSES) and Trigwell and Prosser's (2004) Approaches to Teaching Inventory (ATI) conceptual change and student-focused (CCSF) subscale and to guide the development of the attitude measure.

**Efficacy for conducting SCI.** TSES (Tschannen-Moran & Woolfolk, 2001) comprises three subscales, each measuring teacher self-efficacy in student engagement, instructional strategies, and classroom management. This instrument is considered appropriate for use as partial indicators for attitudinal measure of SCI because the same scale has been shown to either predict or positively correlate with teaching practice that reflects constructivist principles (Nie et al., 2012; Temiz & Topcu, 2013). Given the focus of this study to examine self-efficacy associated with instructional delivery, only the instructional strategy subscale will be relevant. Appendix I (items 12 – 19) indicates the eight items in the TSES instructional strategy subscale. Survey participants responded to questions such as “How much can you provide an alternative explanation or example when students are confused?” and “How confident are you that you could adjust your lessons to the proper level for individual students?”, with response options comprising of five-category ratings: (1) not at all, (2) very little, (3) some, (4) quite a bit, and (5)
a great deal. Analysis of survey results from 410 teachers yielded a reliability score of 0.90 and 0.86 for the total measure and the instructional strategy subscale respectively (Tschannen-Moran & Hoy, 2001). Observations of high variance in second-order factor and moderate positive correlations between the three subscales, as well as significant correlations (r=0.18 and 0.52, p<0.01) in construct validity tests with Rand items confirmed the acceptable use of each subscale separately (Tschannen-Moran & Woolfolk Hoy, 2001).

Conception of teaching. Trigwell and Prosser's (2004) Approaches to Teaching Inventory (ATI) conceptual change and student-focused (CCSF) subscale was used to operationalize the construct for teaching conception (Appendix I, items 20 - 27). Because the construct of interest for this study pertains to student-centered learning, the two-factor CCSF subscale was adopted as measure for teaching conception. The subscale consists of four conceptual change intention items (CC) and four student-focused strategy items (SF). An example statement for CC items is “I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop” An SF question include “In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying.” Survey participants were asked to identify to a particular teaching subject and respond on a five-point Likert scale (1) only rarely true for me, (2) sometimes true for me, (3) true for me about half the time, (4) frequently true for me, and (5) almost always true for me. While only moderate reliability scores were observed for the Approaches to Teaching Inventory (ATI) subscales for student-centered and teacher-centered instructions (α = .74 & .66 respectively; Prosser & Trigwell, 2006), significant correlations between ATI scores and Biggs' Study Process Questionnaire on students' surface and deep approach suggests its acceptable use (Trigwell & Prosser, 2004). The authors assert that the ATI scale is context specific and appropriate for a relational representation of the teaching
approaches. Such usage is already evident in large-scale research on pre and postintervention comparison on teaching conception as well as investigation on the variation in teaching with respect to a particular environment with statistically significant results (e.g., Bowe, 2013; Gibbs & Coffey, 2004; Struyven, Dochy & Janssens, 2010; Wilkesmann 2013).

**Self-reported implementation.** SCI implementation in general involves regular application of a combination of teaching strategies that align with constructivist features (Henserson et al., 2012). Accordingly, the self-reported implementation measure was represented by usage frequency and the number of SCI used in a typical lesson. I also compared the average usage frequency and number of SCI adoption before and after intervention (Appendix I items 10 & 11).

**Participants’ experience.** While quantitative measures provide descriptive statistics on the intervention effects for this study sample, as part of the criteria for mixed methods research to attain significance enhancement and content validation, qualitative data were also included to “enhance the interpretation of significant findings” (Collins et al., 2006, p. 84). To this end, I invited participants from both the comparison and treatment group to share their mobile learning experience in separate focus groups after the intervention (Appendix H). Primary themes explored in the focus group were the specific features of mobile learning that facilitate the adjuncts’ decision about SCI and the differences in the quantity and quality of participation across the two groups. An example question on the features of the mobile application is “What features of the mCoP do you like and not like?” To elicit responses on patterns of participation, adjuncts were asked “Where and when did you usually access the micro courses?”

**Procedure**

This section describes the participant recruitment procedure, proposed timeline of the intervention, the mCoP activities, and the organization of the intervention components according
to the instructional design framework discussed in Chapter Three. As stated in the previous chapter, the intervention was adapted by overlaying of Taylor et al.’s (2006) task model for mobile learning onto the Wenger’s (1998) community of practice dimensions. The activities in the mCoP adopt the whole task approach and follow the simple to complex sequencing 4C/1D model by van Merrienboer et al. (2010), while the content is informed by Blumberg’s (2009) rubrics for SCI infusion.

**Participant Recruitment**

Forty-nine participants were recruited for the study. Participants self-selected into the comparison and treatment group. Twenty-four joined the comparison group (i.e., mobile learning via an in-house developed application) and 25 in the experimental group (i.e., mobile learning via an in-house developed application and mCoP). Participants were presented with an informed consent form (Appendix J), which indicated that their participation would not have any impact on their current or future relations with SPEI. To further avoid feelings of coercion given the adjunct faculty members’ contracts are renewable each term, the researcher emphasized that her role in the institution does not involve decision making related to teaching appointment and no identifiable data would be shared. I also conducted face-to-face meetings with potential participants to provide further assurance and clarification when necessary. Ample time was provided for potential participants to consider enrolling and obtaining their signature.

**Mobile Learning PD Components**

The mobile learning PD for SCI consists of two components. The first is a series of short videos and articles on SCI (i.e., micro courses) delivered using an in-house developed mobile application, STELLAR. The second is the mCoP component housed in social software known as Workplace, which is the enterprise version of the widely-used Facebook application. Participants of the micro courses only formed the comparison group, while the experimental group was
MOBILE LEARNING FOR ADJUNCT FACULTY

comprised of adjuncts who accessed both the micro courses as well as the mCoP. The mCoP participation was through self-selection with members joining a private chat group in the Workplace software. The subsections below elaborate the launch of the mobile learning PD, elements of the SCI micro courses in STELLAR, and the mCoP activities. Appendix K shows the timeline of events for the mCoP and sample activities.

**Launch of mobile learning.** The SCI micro courses were launched on November 23, 2017. Although I planned to invite treatment group participants to the mCoP the week after, this step was delayed to January 2018 because of slow enrollment of the treatment group into the SCI micro courses.

The following publicity activities were carried out to invite adjuncts to embark on the mobile learning PD on SCI:

1. Email invitation from Teaching and Learning department to the whole population of SPEI adjuncts to access the SCI micro courses on STELLAR.
2. One week after the introduction of the SCI micro courses, another invitation was sent out to invite people who have enrolled in STELLAR to participate in the mCoP via a private group in Workplace.
3. Distribution of brochures with instructions and QR codes for quick installation.
4. Promotion of mobile learning during regular adjuncts’ meetings or PD sessions.
5. Personal invitation by the author and peers in the mCoP.

**Micro courses.** Micro courses for the five SCI techniques were uploaded into the STELLAR mobile application. Contents in the micro courses included web curated resources, video segments of teaching episodes, interviews of SPEI adjuncts who have successfully implemented the SCI, and personal reflection prompts. In keeping with the preferential features for mobile learning object development discussed in the previous chapter (Churchill & Hedberg,
MOBILE LEARNING FOR ADJUNCT FACULTY

2008; Shen, Wang, Gao, Novak & Tang, 2009; Wang & Shen, 2012), the content for each engagement session in the micro course was limited to no more than fifteen minutes with minimal typing. Because SCI techniques may be adapted across different lessons and teaching subjects, they represent the supportive information that adjuncts retrieve whenever they plan to deliver a lesson aligned with features of constructivism. Therefore, the micro courses were planned to be offered ahead of and outside of the mCoP activities to reduce extraneous cognitive load, as recommended by van Merrienboer et al. (2010). Table 4.5 provides an example of a micro course on teaching with concept map.

Table 4.5

Example Micro Course

<table>
<thead>
<tr>
<th>Micro course segment</th>
<th>Activity / Resource</th>
<th>Duration (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are concept maps?</td>
<td>Read web article: What are concept map <a href="http://www.cmu.edu/teaching/assessment/howto/assesslearning/conceptmaps.html">http://www.cmu.edu/teaching/assessment/howto/assesslearning/conceptmaps.html</a></td>
<td>3</td>
</tr>
<tr>
<td>How to build a concept map?</td>
<td>Watch video demonstration by SPEI adjunct constructing a concept map for a Business Law topic</td>
<td>6</td>
</tr>
<tr>
<td>Developing a mental representation with concept map</td>
<td>Watch video interview and a teaching episode on how SPEI adjunct teach Principles of Accounting with a concept map</td>
<td>4</td>
</tr>
<tr>
<td>Different ways of using concept maps for teaching or assessment</td>
<td>Watch Youtube video <a href="https://www.youtube.com/watch?v=GmIowf0uGFM">https://www.youtube.com/watch?v=GmIowf0uGFM</a></td>
<td>6</td>
</tr>
<tr>
<td>Reflection</td>
<td>What are the key concepts that your students often struggle with? How might you modify what you teach, how you teach, or how students learn using concept maps?</td>
<td>5</td>
</tr>
<tr>
<td>Additional readings and tools</td>
<td>The Theory Underlying Concept Maps and How to Construct and Use Them</td>
<td>5</td>
</tr>
</tbody>
</table>
**mCoP activities.** Timely provision of an optimum amount and type of support is necessary to help mCoP participants focus only on specific task elements intended for skill acquisition without overloading their mental capacity (van Merrienboer et al., 2010). While Blumberg’s (2009) rubrics provide a systematic framework for critical examination and transformation of courses to student-centered pedagogical practices, the assessment of course status against 29 components across five dimensions of student-centered teaching, along with the requirement to study the feasibility of instructional transformation amidst potential obstacles, is likely to overwhelm the adjunct faculty who is confronted with the new information for the first time. In view of this concern, the intervention focused on Blumberg’s recommendation of “low-risk changes” and address only the components in the first three dimensions (Appendix E).

Additionally, as discussed in Chapter Three, van Merrienboer et al.’s 4C/1D simple to complex sequencing of the mCoP activities with gradual diminishing support provide the necessary scaffolding. Table 4.6 shows description of mCoP activities sequenced according to 4C/1D model. Appendix K shows a sample of planned weekly activities and discussion prompts.

Table 4.6

<table>
<thead>
<tr>
<th>Task complexity</th>
<th>4C/1D task types</th>
<th>Task description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>Worked-out example: both problems and solutions are provided</td>
<td>Given a list of suggested instructional changes and corresponding SCI components being addressed, participants discuss their understanding for the identified level of transitioning towards SCI.</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Reverse task: predict the problem for the provided solution</td>
<td>Given case vignettes of instructional changes, participants examine the rubrics and identify the correct SCI component addressed.</td>
</tr>
<tr>
<td>High</td>
<td>Conventional: find solution to the problem</td>
<td>Participants assess own course against the rubrics and plan for SCI infusion</td>
</tr>
</tbody>
</table>
For each activity, adjuncts were intended to be introduced to the full task of SCI infusion but at different levels of complexity. Starting from a worked-out example, the adjuncts gain insights into the entire six steps of the transformation process and become familiar with various components of the rubric. Subsequently, they were shown case vignettes of instructional change and discussed the corresponding dimensions the SCI technique was addressing. For example, participants read an excerpt about how a gamified course increased student participation in classroom discussion. They would then choose from a list of SCI components and determine the appropriate levels of transitioning towards SCI. Discussion questions prompted participants to explain their choice and explore strategy adaptation for their own courses (see sample activities in Appendix K). Through repeated exposure to a variety of SCI infusion exemplars, adjuncts focused their attention on developing their skills to determine the qualitative distinctions across transitioning levels of SCI in Blumberg’s rubric. Participants were also given an opportunity to brainstorm solutions to anticipated obstacles to SCI during the intermediate task level. With the familiarization of the rubrics and opportunities for peer support in the mCoP environment, I hypothesized that adjuncts would grow in confidence to transform their own course to include SCI in the final weeks.

Data Collection

Data collection methods included pre and postintervention online surveys (Appendix I), focus group data (Appendix H), and log data from the mobile learning platforms (Appendix G). The online survey was administered twice via an email link, before and after the intervention, to both the comparison and experimental group. During the first administration of the online survey, respondents were also invited to opt in for focus group participation at the end of the eighth week. They were then asked to indicate in their informed consent (Appendix J) to allow
the researcher to use their mCoP interactions and mobile log data for the study prior to enrolling in the Workplace private chat group.

**Online surveys.** The pre-intervention survey link was sent via an email in October 2017 along with the informed consent form. While the adjuncts were expected to have already installed the Workplace and STELLAR mobile application as part of the institution’s earlier initiative separate from this study, adjuncts keen to take part in this study but who had yet to download the applications were directed to the institution’s web portal for instructions. Participants received the post-intervention survey in their emails during the final week of February 2018.

**Chat logs and application analytics.** Weekly mCoP chat logs formed the qualitative data to evaluate participant responsiveness. I retrieved this information from Workplace software by taking screenshots of the online postings. With regards to the quantity of participation (e.g., posts count and number of enrolled micro courses), the mobile application analytics were downloaded weekly from the administrator dashboard for Workplace and STELLAR.

**Focus groups.** Two focus groups were conducted (Appendix H), each for the comparison and treatment group during February and March 2017 respectively. I facilitated the focus group discussion with another academic developer assisting in note taking. Both groups responded to questions relating to their experience with the mobile learning features and participation levels. The focus group for the mCoP participants were asked additional questions to provide information for the fidelity measures.

**Data Analysis**

Appendix F is the summary matrix that maps the research questions, indicators of measurement, timeline for data collection, and data analysis. Four types of data were analyzed. They are online survey responses, mobile application analytics, mCoP chat content, and focus
group responses. This section discusses the data analyses for the process and outcomes evaluation.

**Process evaluation.** The investigation of the fidelity of implementation (i.e., RQ1) comprised of data analysis on adherence to the task model and participant responsiveness. To determine adherence to the task model, focus group transcripts were coded into themes following Frohberg et al.’s (2006) continua for context, control, and communication factors. Focus group members’ responses were categorized along the task model dimensions according to the position they indicated for the three scales shown in Appendix H. The degree of adherence to the task model was determined by counting the number of occurrences that the context, control, and communication factors were rated at the highest level (i.e., physically or socially situated, full control, and collaboration). In terms of participant responsiveness, the number of micro course enrollment and average duration of course completion were computed to compare the difference in the level of participation between the intervention groups. I plotted the weekly mCoP interaction frequency for each participant to identify patterns of increasing participation. Chat content in the mCoP was uploaded into the DeDoose software and tagged with codes derived from literature (Appendix H, items 7 to 16). Following the convergent design approach, both the post frequency and chat content were reviewed as a whole for interpretation of participant responsiveness.

**Progression in the innovation-decision stages.** To evaluate changes in the Rogers’ innovation-decision stages (i.e., RQ2), I conducted paired t-tests for pre and postintervention data using the SPSS software. The data analyzed included SCI awareness, TSES for instructional strategy subscale, ATI for conception of teaching subscale, and self-reported SCI implementation. In addition to group level analysis, each participant’s pre and postintervention scores for awareness, attitude, self-reported implementation was compared qualitatively to
determine individual progression in one or all the stages of the innovation-decision process. Data from process evaluation and note-taking activities in STELLAR mobile application were included for explanatory purposes.

**Participants’ experience.** The focus group discussion about the participants’ experience (i.e., RQ3) provided insights to the nuances of the change process. The focus group transcripts were reviewed to identify themes associated with changes in SCI thinking (i.e., RQ3a) and the overall mobile experience of the participants (i.e., RQ3b). Using the inductive coding approach (Thomas, 2006), close readings of the transcripts and creation of general themes aligned with the research aims were conducted. I used the DeDoose software for coding of the text segments and generation of frequency data. Repeated readings of the scripts were conducted to refine the category systems and to select quotes that conveyed the essence of the theme. I organized the text segments along the focus group prompts (Appendix H, items 4 to 14) to reveal similarities and differences between the comparison and treatment group. For the treatment group, post content from the mCoP were also included to corroborate the findings from the focus group.
Chapter 5

This chapter describes the process of implementation and discusses the intervention results by addressing each research question. The first section includes a description of the implementation timeline, a review of the participants’ characteristics in both comparison and treatment groups, followed by visual descriptions of the mobile applications used in this study. The second section presents the findings from the analysis of the pre- and post-intervention questionnaire, analytics from the mobile applications, and focus group sessions. As stated in the previous chapters, Rogers’ (2003) innovation-decision process provided the framework to trace the changes in participants’ awareness, attitude, and self-reported implementation of SCI. The discussion of the results follows a convergent mixed method research design to illustrate the progression of the SCI innovation-decision process based on evidence drawn from the fidelity of implementation, statistical analysis, and qualitative feedback of the participants. Differences in innovation-decision process and participants’ experience across the two intervention groups shed some light on the implications for practice associated with supporting instructional change amidst the complex web of contextual and personal factors. Finally, the chapter highlights the limitations of the study before ending with a concluding remark.

Process of Implementation

With the support of the Teaching and Learning Division in SPEI, I developed and published the STELLAR mobile application, with SCI micro courses, in the Apple and Android platforms on November 23, 2018. The launch was rescheduled from the originally planned date in September because many adjunct faculty members indicated their preference to start during the year-end term breaks. However, fewer than half of the participants from both the comparison group and treatment group enrolled into the SCI micro courses due to a variety of reasons. Anecdotally, participants indicated vacation travels as well as other personal and assessment
grading commitments. Therefore, upon the request of participants, I extended access to the SCI micro courses in STELLAR for another six weeks beyond the intended eight weeks. The mCoP activities began on January 5, 2018 and lasted for seven weeks. I had initially intended for treatment group participants to engage in the mCoP only after they had completed the SCI micro courses. However, by January 2018, only ten participants had enrolled, and none had completed all of the five micro courses. Consequently, I invited the participants to join the mCoP while simultaneously going through the SCI micro courses in STELLAR rather than joining the mCoP after completing the SCI content.

SCI Micro Courses in STELLAR

Participants enrolled in five SCI micro courses hosted in STELLAR – an in-house mobile learning application. As described in Chapter 4, the micro courses introduced the application of Blumberg’s (2009) SCI principles as demonstrated by five teaching strategies, namely, whole-class discussion (W), peer instruction (P), concept maps (C), real-time polling (R), and multiple drafts (D). Because STELLAR hosts other non-intervention related resources, the SCI micro courses were labeled with prefix “SCI” and numbered from one to five for easy identification of the contents required for this project. Figure 5.1 below shows the screenshots of the course menu, synopsis of one of the SCI teaching methods, and an example of mobile learning activities for one micro course segment.
In addition to STELLAR, treatment group members participated in a mCoP within a social software known as Workplace. The initial planned activities (Appendix K) involved getting participants to work through a series of case vignettes with simple to complex tasks designed according to the 4C/1D instructional design framework (van Merrienboer et al., 2010) to support SCI infusion into the classroom. I intended to facilitate seven weekly discussions to introduce various exemplars of SCI implementation and to prompt participants to perform self-assessment of their level of transitioning towards SCI with reference to Blumberg’s (200) rubric. However, mCoP members took longer time than expected to respond to the prompts. For example, the response time for the ice-breaker activity posted on Jan 5, ranged from three to 26 days. Because there was a tendency for participants to focus on barriers to SCI implementation, I
decided to spend more time responding to comments and to ask follow-up questions to shift the focus towards solution-oriented conversation. An example to illustrate this point is the activity on January 17 that required participants to describe their desired classroom scenario based on Blumberg’s (2009) SCI indicators. To encourage participants to envision their SCI goals, I continued to facilitate this activity into the following week instead of starting a new thread. After the initial prompt, I added seven more posts throughout the week acknowledging concerns, seeking clarification regarding participants’ posts, and pointing members’ attention to a resource about learning and cognition. Figure 5.2 below shows the screenshots of my facilitative moves for the activity.

![Figure 5.2. Screenshots of my facilitation on Workplace](image-url)
Over the seven-week intervention, similar adjustments were made to facilitate progressive engagement while ensuring positive emotional connection for sustained mCoP involvement (Harasim, 2012; Preece & Schneiderman, 2009). Following Dusenbury et al.’s (2003) recommendations, adaptations in activity pacing, as stated in the example above, media choices of the case vignettes (e.g., videos instead of text articles), and response modality (e.g., options for polling, one-word answers besides text inputs) were incorporated based on weekly process evaluation data to ensure adherence to the fidelity indicators proposed in Chapter Four. These indicators are Taylor et al.’s (2006) task model and Wenger’s (1998) learning trajectory. Therefore, some of the planned activities such as delineating the planning steps and identification of SCI level were replaced by focused conversations to clarify participants’ understanding of SCI as well as to support sense making about how to shift the responsibility of learning to students (Bickerstaff & Cornier, 2015).

Findings

This section reports the findings of the intervention and is organized according to the three research questions outlined in Chapter Four. Results from the two focus group discussions, mobile application analytics, and mCoP activities informed the analysis of implementation fidelity (i.e., RQ1). Pre- and post-intervention surveys on SCI awareness, attitude towards SCI, and self-reported implementation of SCI provided statistical insights to the outcomes measure of the innovation-decision process (i.e., RQ 2). Using the convergent design approach, observations from the fidelity analysis were juxtaposed with the survey responses to develop a more in-depth understanding of the quantitative findings (Creswell & Clark, 2012). Finally, I analyzed the focus group transcripts to determine similarities and differences in the participants’ experience between the comparison and treatment groups, specifically, to identify features of mobile learning that facilitate the innovation-decision process towards SCI, as well as to understand the
quality and quantity of participation between the two groups (i.e., RQ 3). Each participant was given an alphanumerical identifier. Prefixes “C” and “T” signify comparison and treatment group respectively followed by a running number assigned according to the sequence the individual completed the pre-intervention survey. Postfixes “F” and “M” distinguish between female and male participants respectively.

**Implementation Fidelity**

As described previously, fidelity measures were indicated by the adherence to Taylor et al.’s (2006) task model and Wenger’s (1998) participant responsiveness. To determine whether the intended design affordances of the task model were realized, I conducted focus group sessions with members from the two intervention groups. Six and eleven participants volunteered to attend the focus group discussion for the comparison and treatment group, respectively. For participant responsiveness in the mCoP, I examined weekly chat data downloaded from the Workplace mobile application. The analyses for program fidelity are elaborated below.

**Adherence to task model.** During the focus group sessions, participants discussed their perception of context-sensitiveness, sense of agentic control, and forms of communications while interacting with the features and learning activities in STELLAR and Workplace. Table 5.1 shows the participants’ responses along the spectrum of the context, control, and communication dimensions of the task model.
### Table 5.1

**Participants self-report of task model adherence**

<table>
<thead>
<tr>
<th>Focus Group Participants</th>
<th>Comparison (C)/Treatment (T)</th>
<th>Context</th>
<th>Control</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>C6F</td>
<td>C</td>
<td>None</td>
<td>Some</td>
<td>No one</td>
</tr>
<tr>
<td>C21F</td>
<td>C</td>
<td>None</td>
<td>Some</td>
<td>No one</td>
</tr>
<tr>
<td>C17M</td>
<td>C</td>
<td>None</td>
<td>Some</td>
<td>No one</td>
</tr>
<tr>
<td>C18F</td>
<td>C</td>
<td>Physical</td>
<td>Some</td>
<td>No one</td>
</tr>
<tr>
<td>C16M</td>
<td>C</td>
<td>Physical</td>
<td>Some</td>
<td>No one</td>
</tr>
<tr>
<td>C10M</td>
<td>C</td>
<td>Physical</td>
<td>Full</td>
<td>No one</td>
</tr>
<tr>
<td>T10M</td>
<td>T</td>
<td>None</td>
<td>None</td>
<td>Collaboration</td>
</tr>
<tr>
<td>T12F</td>
<td>T</td>
<td>None</td>
<td>Some</td>
<td>No one</td>
</tr>
<tr>
<td>T17F</td>
<td>T</td>
<td>Physical</td>
<td>Some</td>
<td>Loose</td>
</tr>
<tr>
<td>T13F</td>
<td>T</td>
<td>Physical</td>
<td>Full</td>
<td>No one</td>
</tr>
<tr>
<td>T16F</td>
<td>T</td>
<td>Physical</td>
<td>Full</td>
<td>Loose</td>
</tr>
<tr>
<td>T20M</td>
<td>T</td>
<td>Social</td>
<td>Some</td>
<td>Loose</td>
</tr>
<tr>
<td>T6M</td>
<td>T</td>
<td>Social</td>
<td>Some</td>
<td>Collaboration</td>
</tr>
<tr>
<td>T9M</td>
<td>T</td>
<td>Social</td>
<td>Full</td>
<td>Loose</td>
</tr>
<tr>
<td>TM1</td>
<td>T</td>
<td>Physical / Social</td>
<td>Some</td>
<td>Loose</td>
</tr>
<tr>
<td>T8F</td>
<td>T</td>
<td>Physical / Social</td>
<td>Some</td>
<td>Loose</td>
</tr>
<tr>
<td>T3M</td>
<td>T</td>
<td>Physical / Social</td>
<td>Full</td>
<td>Loose</td>
</tr>
</tbody>
</table>

**Context.** To enhance the situatedness of mobile learning (i.e., “Context” dimension), both STELLAR and the mCoP incorporated activities to invite participants to interact socially with people outside the virtual space as well as with their physical surrounding. Participants from both groups took advantage of the note-taking function to synthesize their thinking using context-dependent information. They also attempted the activity that required them to search for metaphors on student-centered teaching and to post them into STELLAR. Within the mCoP environment, participants shared pictures from their context to describe their views of teaching and learning in the self-introduction thread.

Focus group discussion revealed that mCoP members found their mobile learning experience more situated than those accessing only the STELLAR application, as evidenced in the higher number of participants in the treatment group indicating they had chatted with
someone outside the virtual space about the online content (i.e., Social), or shared an artifact from the physical surrounding into the mCoP (i.e., Physical), or have done both (Table 5.1). T20M shared how the context that he was situated in complemented his learning experience in Stellar and the mCoP,

I discussed the [SCI] content with my son. He is an undergraduate at ABC university [another higher education institution]. I remember him telling me about his video lectures in ABC, so I wanted to get his feedback by showing him the videos that I am watching in STELLAR. We also talked about the discussion topics in Workplace. Because I have a different view from T22M’s comment about students using their smartphones during lessons, I was curious about my son’s perspective and the habits of his peers in ABC. As I read through the discussion post and bounced ideas with my son, I learned from there.

Control. The intended design for both the comparison and treatment group was to allow full learner control. Therefore, there was no pre-determined timeline to complete the SCI modules, neither was there a requirement for timed response in the mCoP. However, almost all the focus group respondents, except for one in the comparison group and four in the treatment group, reported that they experienced some autonomy instead of full autonomy. Because of poor internet connection, on-demand access to uninterrupted video viewing was not always possible. Participants in both groups also felt compelled to follow the sequential presentation of the SCI micro courses. C21F’s description on the manner she approached her learning in STELLAR illustrated the experience of partial learner control,

I viewed the [SCI] content when I travel in the car – my husband drives me. The SCI modules were numbered so I felt that I needed to follow the sequence. I wasn’t sure if the different pieces were linked or not, so I thought I should just follow according to the
numbers. I also scrolled through quickly the topics that I wasn’t interested in. I kept having problems viewing the videos continuously, maybe my internet bandwidth is low. It would be nice to be able to download the videos, but I worry about the storage capacity in my phone too.

Interestingly, the ordered course content in STELLAR was helpful in providing a sense of control for other participants including T3M, who pointed out, “I felt I have full control of the learning. The [SCI] content is very structured, so I know what to expect next.” This observation aligns with Frohberg et al.’s (2009) assertion on facilitating moderate to full learner control when designing for non-homogeneous mobile application users.

A barrier to attaining high levels of control unique to the treatment group members is privacy issues. Six of the eleven focus group participants expressed concerns about unintentional disclosure of student identity, leakage of conversational threads outside of the chat group, as well as risks of misunderstanding due to the absence of verbal and affective dimensions in computer-mediated communications. The frequency for each type of concerns and the corresponding focus group quotes are indicated in Table 5.2.
Table 5.2

**Barriers to full learner control in mCoP**

<table>
<thead>
<tr>
<th>Concerns</th>
<th>Focus group quotes (Participant), N = 11</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student privacy</td>
<td>If I mentioned in Workplace about particular students in my class with disability or who exhibit strange learning behaviors, it may be a violation of the students’ privacy. There is need to have a lot of discretion in the posts. Sharing might lead to bigger problems. (T12F)</td>
<td>2</td>
</tr>
<tr>
<td>Leaked conversations</td>
<td>I feel more comfortable replying to people I know. I need to know that I am able to communicate with the person first before I continue with the virtual session. My concern is privacy. Someone might take a screenshot and do something about it. (T9M)</td>
<td>2</td>
</tr>
<tr>
<td>Misunderstanding</td>
<td>The online communication could get sensitive and uncomfortable. The tone may sound aggressive but it’s actually not. There are also cultural factors that influence the way we post and understand another’s comment. I would be less concern if this is one to one text message. (T10M)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Communication.** Given that STELLAR’s design is a one-way and self-paced content transmission mobile application, it is understandable that all the focus group participants in the comparison category accessed the content independently and did not interact with others (Table 5.1). However, there was evidence of communicative features that facilitated individual reflections and multiple ways of content engagement. For example, C18F switched between STELLAR and Microsoft windows applications to take notes on her desktop computer. According to her, “These notes add to my existing references for classroom strategies. I want to be able to retrieve them without going back to STELLAR.” C18F also appreciated the video controls and interoperability of STELLAR across different devices,

The video controls were helpful, so there was no need to watch the entire video. Because I can access it [SCI micro course] through different platforms, I can decide to use my phone or the computer. When I see that I am going to spend longer than 30 minutes, I will use my big desktop.
While STELLAR exemplifies learning in isolation in the communication spectrum of the task model, mCoP offers opportunities for multiway conversations through social interactions. Out of the eleven focus group participants who joined the mCoP, seven indicated that they had casual conversations (i.e., “Loose”) with the chat group members, two experienced collaborative communications, and two did not engage in any social interaction (Table 5.1). Most of the participants considered the mCoP as a platform to share their views and highlighted that they were more comfortable interacting with familiar peers. T1M noted, “I usually respond to express my agreement or disagreement, but mainly with T10M, T19M, T22M, T25M, and T3M as they are the more responsive ones. I tend to be more reserved with the others.”

Despite the absence of an explicit mCoP activity requiring members to work with another member online, T6M and T10M ranked the level of communication as “Collaborative”. This perception is captured in T6M’s response,

I tried to be participative because I enjoyed this experience very much. I often think to myself “Let me go in and comment”, it has a feel-good factor. The ice-breaker was helpful too. I also started to “like” other people’s post as a way to encourage them to participate more.

On the opposite end of the continuum, T12F was non-participative because “I am OK to review the comments, but I don’t want to get caught up in the debates … I just don’t find this an effective way to spend my time”, while T13 expressed her frustration with the seemingly disjointed conversations, “The discussion in Workplace seems unrelated, there were [sic] too much information, so I get lost … The objectives of the discussion were not clear to me. Between the two applications, I feel more engaged with STELLAR.

Although individual perception of context-sensitivity, learner control, and communicative options vary, the focus group discussion revealed that treatment group members...
were more likely to experience all the three dimensions of the task model than the comparison group members. The findings suggest that the combined features of both STELLAR and Workplace were successful in eliciting the pedagogical value of mobile learning described by Taylor et al. (2006). Besides adherence to the theoretical framework, the indicator for implementation fidelity for this project included an investigation on participant responsiveness, which is discussed in the following section.

**Participant responsiveness.** Using the analytics from the STELLAR and Workplace administrator’s dashboard, I analyzed weekly SCI course enrollment and mCoP post frequency to determine the quantity of participation. For qualitative indicators, every post in the mCoP was coded against Wenger’s (1998) learning trajectories, namely peripheral, inbound, and insider, based on the interaction types shown in Appendix G.

**Quantity of participation.** Table 5.3 and Figure 5.3 show the enrollment of SCI micro courses in STELLAR between the comparison and treatment group. While the percentage of participants enrolled in the micro courses is comparable in both groups (Figure 5.3), treatment group members accessed a fewer number of micro courses ($M = 3.8, SD = 1.58$) than the comparison group ($M = 4.00, SD = 1.58$). Participants in the treatment group spent 2.5 weeks longer ($N = 15, M = 5.93, SD = 4.89$) than the comparison group ($N = 15, M = 3.40, SD = 2.47$) to go through all the five micro courses. An independent t-test on access duration computed in days revealed that the difference between the groups is significant; $t (28) = 2.26, p = 0.03$. 


Table 5.3
Number of enrolled micro courses STELLAR

<table>
<thead>
<tr>
<th>Participation indicators</th>
<th>Comparison</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Average number of micro courses enrolled (SD)</td>
<td>4.00 (1.47)</td>
<td>3.80 (1.58)</td>
</tr>
<tr>
<td>Number of participants completed all five micro courses (%)</td>
<td>15 (62.5%)</td>
<td>15 (60%)</td>
</tr>
<tr>
<td>Average duration to course completion in weeks (SD)</td>
<td>3.40 (2.47)</td>
<td>5.93 (4.89)</td>
</tr>
<tr>
<td>Average duration to course completion in days (SD)</td>
<td>22.47 (18.15)</td>
<td>45.27 (34.67)</td>
</tr>
</tbody>
</table>

Figure 5.3. SCI micro courses enrollment in STELLAR

With regards to quantitative measures of mCoP activities, 22 out of 25 members logged into the Workplace mobile application and enrolled themselves into the chat group, 18 posted at least once or participated in the polling activity, and the remaining four viewed or “Liked” at least one post. Excluding the posts from the mCoP facilitator, “Like” reactions, and viewing activities, the 18 participants contributed to a total of 135 posts. Weekly statistics demonstrated alternating high and low participation throughout the seven weeks of intervention with a promising increasing trend emerging from the fifth week (Figure 5.4). The number of members
who logged in weekly, including those who viewed but did not participate (i.e., “lurkers”) ranged from nine to 17 ($M = 12.14$, $SD = 2.97$) with the highest number in week seven.

Figure 5.4. Weekly mCoP participants and post count

Although there was no clear rising trend in the number of active members and post quantity across the intervention, an examination of the average response time to facilitator-initiated and member-initiated posts revealed a different perspective. Table 5.4 illustrates the average number of days mCoP participants took to respond to an activity or a new thread. The delayed response of more than three weeks for Post #1 and Post #2 contributed to the peak activity observed in Week #3 as shown in Figure 5.4. The data in Table 5.4 suggest that mCoP participants took a longer time to respond to the first few posts (i.e., Posts #1, #2 & #3), but eventually became more responsive in subsequent activities. Out of the 22 members who logged into the Workplace chat group, two to 14 members contributed to the mCoP activities over the course of the seven weeks, while the rest of the members did not post any comments and only viewed the comments of others. The different levels of participation may be linked to the concerns described in the previous section (Table 5.2) such as leaked conversations and
misunderstanding risks. Qualitative analysis of weekly responses in the next section provide further insights on the pattern of mCoP participation for individual members.

Table 5.4

*Response time to posts*

<table>
<thead>
<tr>
<th>Post number / Week number</th>
<th>Post#1 Wk1</th>
<th>Post#2 Wk1</th>
<th>Post#3 Wk2</th>
<th>Post#4 Wk3</th>
<th>Post#5 Wk5</th>
<th>Post#6 Wk6</th>
<th>Post#7 Wk6</th>
<th>Post#8 Wk6</th>
<th>Post#9 Wk7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>14</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Average days to respond</td>
<td>9.36</td>
<td>11.40</td>
<td>3.50</td>
<td>1.83</td>
<td>0.00</td>
<td>1.00</td>
<td>3.33</td>
<td>1.60</td>
<td>0.64</td>
</tr>
<tr>
<td>SD</td>
<td>7.08</td>
<td>8.32</td>
<td>2.59</td>
<td>3.25</td>
<td>0.00</td>
<td>1.73</td>
<td>2.08</td>
<td>3.05</td>
<td>2.41</td>
</tr>
<tr>
<td>Minimum days to respond</td>
<td>3.00</td>
<td>5.00</td>
<td>2.14</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Maximum days to respond</td>
<td>25.75</td>
<td>21.00</td>
<td>8.00</td>
<td>8.00</td>
<td>1.00</td>
<td>3.00</td>
<td>5.00</td>
<td>7.00</td>
<td>9.00</td>
</tr>
<tr>
<td>Comment ratio facilitator / members</td>
<td>0.5</td>
<td>0.67</td>
<td>0.42</td>
<td>0.46</td>
<td>0.75</td>
<td>0.50</td>
<td>0.14</td>
<td>0.45</td>
<td>0.11</td>
</tr>
</tbody>
</table>

*Quality of participation.* I used Dedoose, an online qualitative analysis software, to code all the mCoP posts and comments. For every post initiated by the facilitator, mCoP members had the opportunity to participate in a variety of ways. By following Wenger’s (1998) definition of learning trajectory in a community of practice as well as Preece and Schneiderman’s (2009) Reader-to-Leader framework described in Chapter Three, I coded the online interactions as peripheral, inbound, and insider (Appendix G). Interactions such as a “Like” or a brief acknowledgement were coded as peripheral, substantial responses to and comments aligned with mCoP activities were considered inbound, and contributions of new artefacts or comments that demonstrate convergence of ideas as well as those that attempt to drive the discussion forward were categorized as insider posts. Table 5.5 shows sample mCoP comments for each level of Wenger’s learning trajectory and Figure 5.5 displays the frequency of interaction types assigned to the corresponding sub-codes. It can be observed that the majority of the interactions were “inbound”, comprising primarily of responses to the mCoP activity prompts (49.04%). Peripheral types of interaction constituted 28.10% while insider posts stood at 10.15%.
### Table 5.5

*Sample mCoP responses and the assigned Wenger’s learning trajectory*

<table>
<thead>
<tr>
<th>Learning trajectory</th>
<th>Sub-code</th>
<th>Sample mCoP responses / reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral – browsing and reviewing to get acquainted</td>
<td>Brief acknowledgment</td>
<td>Thanks for sharing Mr [name]. Mentimeter is a very useful</td>
</tr>
<tr>
<td></td>
<td>“Like” reaction</td>
<td>No posting. Only clicked the “Like” button</td>
</tr>
<tr>
<td>Inbound – begin to identify with mCoP by posting thoughts and responding to activities. Posts may be substantial but do not attempt to influence the direction of the conversation</td>
<td>Reflections (reflect on own program or experience and not necessarily aligned to activity)</td>
<td>I am currently teaching the MBA students with a Russian culture - heavily hierarchical, collaborative learning may post a big challenge compare to students in Singapore</td>
</tr>
<tr>
<td></td>
<td>Substantial responses (general comments not aligned to activity)</td>
<td>Self-motivation is a key component in everyone’s life. In life we must be motivated and that should be our interest and NOT the interest of others to motivate. It can be too late, and students are no exception as they will have to run their life at workplace.</td>
</tr>
</tbody>
</table>
|                                                                                     | Aligned to activity (may be brief or one-word response) | Activity: Take a look at the article below. In what ways the SCI strategies introduced in STELLAR can be incorporated into your classroom to teach students to be learning-centered?  
Response: I used stories of previous students who succeed to encourage current students to change their mindset ...I also implemented working of questions to immediately apply what was heard in lecture to encourage learning. |
### MOBILE LEARNING FOR ADJUNCT FACULTY

<table>
<thead>
<tr>
<th>Learning trajectory</th>
<th>Sub-code</th>
<th>Sample mCoP responses / reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insider – create opportunities for collaboration, demonstrate leadership in converging ideas, influence the direction of conversation or attempt to drive the discussion forward with new ideas</td>
<td>Initiate collaboration</td>
<td>Guys, I’m reaching out as I need a little non-technical help in relation to Groups within Canvass please</td>
</tr>
<tr>
<td></td>
<td>Develop relationships</td>
<td>I think you are indeed a better man than me and this is not flattery. I cannot see myself being so patient</td>
</tr>
<tr>
<td>Artifac contribution</td>
<td></td>
<td>Today I had the [module name] lesson. Students took responsibility for their learning by engaging using mobile phones in class by participating electronically and subsequently in oral discussion. The electronic participation was 97%. I was able to see their level of understanding and the diversity of their thoughts Finally as a teacher linking every contribution to the topic the students were engaged. [posted a picture]</td>
</tr>
<tr>
<td>Organize ideas</td>
<td></td>
<td>I tend to agree with T7M and T17F on this. It does require a cultural change when we want students to take ownership which is good and important too. If all of us act together, I believe we can achieve the desired outcome.</td>
</tr>
</tbody>
</table>

*Note. For mCoP responses tagged with more than 1 sub-codes, the higher level learning trajectory is shown*
Figure 5.5. Frequency of sub-codes for peripheral, inbound, and insider interactions

Table 5.6 traces the mCoP members’ interaction types over the course of seven weeks. The number in each cell indicates post count, “Δ” denotes “Like” reaction, a blank cell means viewing only, and a shaded cell represents inactivity. The letter “C” is attached to the cell if at least one of the posts were associated with insider (core) characteristics. This annotation identifies at which point the mCoP participants began to demonstrate insider types of contribution.

Examination of members’ interactions in Table 5.6 revealed two members (T1M & T7M) demonstrating insider characteristics because of their regular contributions and posts that expressed convergence of ideas and attempts to develop relationships from the very beginning of the mCoP. These elements were apparent in T7M’s responses during the first week of mCoP. To
address a member’s concerns about giving students autonomy for SCI implementation, T7M commented,

[Name], you are right, not many people would like to be empowered to take responsibility and ownership … It requires a culture change … and also the necessary skills and competencies…The journey is a long-term solution, but it need[s] time for people to accept and develop such skills.
Table 5.6

*Progressive participation from peripheral to inbound membership*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Wk1</th>
<th>Wk2</th>
<th>Wk3</th>
<th>Wk4</th>
<th>Wk5</th>
<th>Wk6</th>
<th>Wk7</th>
<th>Total</th>
<th>Membership</th>
</tr>
</thead>
<tbody>
<tr>
<td>T7M</td>
<td>4C</td>
<td>2</td>
<td></td>
<td></td>
<td>4C</td>
<td></td>
<td>1</td>
<td>12</td>
<td>Insider</td>
</tr>
<tr>
<td>T1M</td>
<td>5C</td>
<td>4C</td>
<td>2C</td>
<td></td>
<td>2</td>
<td>3</td>
<td></td>
<td>16</td>
<td>Insider</td>
</tr>
<tr>
<td>T6M</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>Inbound</td>
</tr>
<tr>
<td>T3M</td>
<td>1</td>
<td>1</td>
<td></td>
<td>8C</td>
<td>3</td>
<td></td>
<td>1</td>
<td>14</td>
<td>Inbound</td>
</tr>
<tr>
<td>T10M</td>
<td>2</td>
<td>3C</td>
<td>5C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>Inbound</td>
</tr>
<tr>
<td>T25M</td>
<td>7C</td>
<td>1C</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>10</td>
<td>Inbound</td>
</tr>
<tr>
<td>T22M</td>
<td>2</td>
<td>2C</td>
<td>5C</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td>Inbound</td>
</tr>
<tr>
<td>T23M</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td>2</td>
<td>Inbound</td>
</tr>
<tr>
<td>T2M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
<td>Inbound</td>
</tr>
<tr>
<td>T20M</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td>6</td>
<td>Inbound</td>
</tr>
<tr>
<td>T19M</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>7</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T17F</td>
<td>5C</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>7</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T15M</td>
<td>2</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T9M</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T16F</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>5</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T13F</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T5M</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T11F</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T24M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T14M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T12F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T21M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>Peripheral</td>
</tr>
<tr>
<td>T4F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T8F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T18F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* C denotes at least one of the posts were associated with insider characteristic; “◊” denotes “Like” reaction; blank cell denotes viewing only; shaded cell denotes inactivity.

Eight participants took some time to join in the conversation. They began with viewing other members’ post, reacting with “Likes”, or posting short remarks (i.e., peripheral) before progressing to more thorough responses including insider posts in the later weeks. This group of participants demonstrated the inbound membership type. For example, T6M spent the first three weeks of the mCoP reading and liking other members’ comments. He introduced himself only in
the fourth week and eventually became one of the most active participants in subsequent weeks.

Table 5.7 shows excerpts of T6M’s posts in the mCoP in chronological order.

Table 5.7

**T6M’s progressive participation from peripheral to inbound membership**

<table>
<thead>
<tr>
<th>Date</th>
<th>In response to:</th>
<th>T6M’s post</th>
<th>Types of interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Jan – 30 Jan 2018</td>
<td>First three weeks of mCoP activities</td>
<td>[No posting. Only viewed and “liked” posts]</td>
<td>Peripheral – “Like” reaction</td>
</tr>
<tr>
<td>30 Jan 2018</td>
<td>Another member’s self-introduction post</td>
<td>Wow so beautiful colored tree!</td>
<td>Peripheral – brief acknowledgements</td>
</tr>
<tr>
<td>30 Jan 2018</td>
<td>Ice breaker activity (self-introduction)</td>
<td>[Introduced self, courses currently teaching, and posted a picture that describes his role as an instructor]</td>
<td>Peripheral - greeting</td>
</tr>
<tr>
<td>2 Feb 2018</td>
<td>Video activity to identify example of SCI implementation</td>
<td>[Responded to poll] He motivates the students by positive chanting affirmations</td>
<td>Inbound – post aligned with activity</td>
</tr>
<tr>
<td>13 Feb 2018</td>
<td>Member’s post seeking recommendation to get students to be regular users of Canvas [a learning management system]</td>
<td>Canvas allows us [to] check the students log in activities. I actually show them the activity log and encourage them to access Canvas often. Guide them to explore and use Canvas as a useful tool. Encourage them to use Canvas Mobile App until it becomes a routine exercise/habitual activity like brushing teeth</td>
<td>Inbound – substantial response</td>
</tr>
<tr>
<td>16 Feb 2018</td>
<td>Member’s concerns on constant use of smart phones by students in the classroom</td>
<td>Yes, Mobile devices should be used to value add to subject matter, an extension of their mind rather than be an unrelated subject distraction to the students</td>
<td>Inbound – substantial response</td>
</tr>
</tbody>
</table>

While T6M did not progress to core membership within the seven weeks of intervention, T10M’s responses in weeks #6 and #7 were indicative of his efforts to organize ideas associated with SCI (Table 5.8). The inbound trajectory is best encapsulated in T20M’s input during the focus group, “Initially I go through the comments. After a while, I was able to engage in the conversation inside Workplace as well...I started to click on the posts and “Like” more when I see something interesting.” Similar participation growth was observed in the other six “inbound”
members (Table 5.6) although every individual may start with various combinations of peripheral behaviors (e.g., “Like” reactions, lurking, adding emoji, or one-word posts) and exhibit a different progression pace.

The remaining twelve participants are designated as peripheral members. Seven participants were active in the first week of the mCoP but subsequently none of them responded to activity prompts nor commented on other members’ posts. However, most of them remained online and chose to only view the conversations throughout the intervention period.

Table 5.8

<table>
<thead>
<tr>
<th>Date</th>
<th>In response to:</th>
<th>T10M’s post</th>
<th>Types of interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Jan 2018</td>
<td>Ice breaker activity (self-introduction)</td>
<td>[Introduced self, courses currently teaching, and posted a picture that describes his role as an instructor]</td>
<td>Peripheral - greeting</td>
</tr>
<tr>
<td>18 Jan 2018</td>
<td>A question about cheerleading as possible teaching metaphor</td>
<td>… as long as he does not carry Pom Poms [smiley emoji]</td>
<td>Peripheral – brief acknowledgements</td>
</tr>
<tr>
<td>10 Feb 2018</td>
<td>Member’s post seeking recommendation to get students to be regular users of Canvas [a learning management system]</td>
<td>[Name], I have not had a problem with the [module name]. I tell students to self-enroll on Canvas and give them a deadline after which I will no longer accept any new enrollments.</td>
<td>Inbound – substantial response</td>
</tr>
<tr>
<td>15 Feb 2018</td>
<td>Comment on ways to support students to be more responsible for their own learning</td>
<td>… you are right to suggest that the good old pen and paper still triumphs taking photos of the slides. With that said, we also have to understand that they [students] prefer to be totally 'mobile' with their leaning and so we have to allow them to modify their approach to taking notes if this is what suits them</td>
<td>Insider – organize ideas</td>
</tr>
</tbody>
</table>

Defining constituents of high fidelity may be drawn from theoretical guidelines (Saunders, Evans & Joshi, 2005). In the case of mCoP, the ideal participation level over the course of seven weeks may be characterized by growth in the frequency of online interactions and engagements in simple to complex online tasks (Preece and Shneiderman, 2009; Wenger,
1998). As can be seen from the findings above, each mCoP member exhibited varying levels of advancement. Ten of the 22 members (45.45%) demonstrated participation dimensions associated with the hypothesized growth trajectory. High fidelity may be accorded to the intervention because this level of interaction is consistent with literature that linked social networking activities with changing beliefs and practices (Daly, Moolenaar, Bolivar & Burke, 2010). The results from the investigation of implementation fidelity provided the necessary boundary conditions to examine the outcomes associated with the intervention, which will be discussed in the next section.

**Research Question 2: Progression in Innovation-decision Stages**

I analyzed the data collected from the pre- and post-intervention survey to examine the participants’ progression in the innovation-decision process with respect to SCI, namely, their awareness or knowledge level (denoted as “K”), attitude towards SCI, (i.e., “A”), and self-reported implementation of SCI (i.e., “I”). Attitude towards SCI is operationalized by two indicators, (1) the Tschannen-Moran and Woolfolk (2001) teaching efficacy subscale for instructional strategy, which will be termed as “TSES scores” from henceforth, and (2) Trigwell and Prosser’s (2004) Approaches to Teaching Inventory subscale for conceptual change / student-focused teaching, which will be labeled as “ATI scores” in the subsequent sections. The development of a favorable attitude toward SCI will be accorded when positive change in the both the TSES and ATI scores are observed.

Because participants enrolled in a different number of SCI courses and demonstrated varying levels of mCoP participation, survey data only from respondents who enrolled in all five SCI micro courses and logged in to view the mCoP at least once throughout the intervention period were included in the analysis of the innovation-decision progression. Accordingly, the
number of participants in the comparison and the treatment group reduced from 24 to 15 and from 25 to 14 respectively. The profile of the sub-groups was similar to the original grouping (Tables 4.1 to 4.4). I report the findings from the t-test analysis in the paragraphs below before presenting the descriptive statistics to trace the changes in the innovation-decision.

Paired t-test analysis of data before and after intervention did not yield any significant difference for the three indicators of innovation-decision process for both groups (Table 5.9). The stable pre- and post-intervention scores in both groups suggest that participants’ involvement in the mobile learning experience, either via self-paced online learning or combination of self-paced learning with social interaction, may be inadequate to support the progression of innovation-decision. Although participants were given access to the STELLAR micro courses from November 2017 to February 2018, the level of engagement in the online activities varied across individuals. The duration of access to STELLAR also likely lacked the needed treatment dosage to generate observable outcomes. As noted in the analysis of the participants’ responsiveness in the preceding section, some members skipped segments of videos and highlighted impediments to active contribution in the mCoP. Fewer participants indicated implementation of SCI (N in Table 5.9) for both groups also suggests the prevailing use of lecture method. When asked “During a typical class session, which one(s) of the following teaching methods do you implement? Please check all that apply.”, some adjuncts may have considered the listed SCI strategies as not applicable and hence skipped the question altogether. Because participants were introduced to five SCI methods, a careful study on the descriptive statistics of each method may provide further insight.
Table 5.9

Pre and post scores for awareness, attitude (TSES & ATI), and implementation

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Pre-intervention</th>
<th>SD</th>
<th>Post-intervention</th>
<th>SD</th>
<th>P-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness Comparison</td>
<td>15</td>
<td>3.57</td>
<td>0.76</td>
<td>3.57</td>
<td>0.84</td>
<td>0.99</td>
</tr>
<tr>
<td>Awareness Treatment</td>
<td>14</td>
<td>3.39</td>
<td>0.79</td>
<td>3.73</td>
<td>0.70</td>
<td>0.08</td>
</tr>
<tr>
<td>TSES Comparison</td>
<td>15</td>
<td>3.75</td>
<td>0.45</td>
<td>3.93</td>
<td>0.48</td>
<td>0.18</td>
</tr>
<tr>
<td>TSES Treatment</td>
<td>14</td>
<td>3.88</td>
<td>0.54</td>
<td>3.81</td>
<td>0.57</td>
<td>0.53</td>
</tr>
<tr>
<td>ATI Comparison</td>
<td>15</td>
<td>3.57</td>
<td>0.66</td>
<td>3.67</td>
<td>0.68</td>
<td>0.62</td>
</tr>
<tr>
<td>ATI Treatment</td>
<td>14</td>
<td>3.62</td>
<td>0.69</td>
<td>3.55</td>
<td>0.75</td>
<td>0.57</td>
</tr>
<tr>
<td>Implementation Comparison</td>
<td>10</td>
<td>1.80</td>
<td>0.92</td>
<td>1.30</td>
<td>0.68</td>
<td>0.24</td>
</tr>
<tr>
<td>Implementation Treatment</td>
<td>8</td>
<td>1.56</td>
<td>0.73</td>
<td>1.56</td>
<td>0.89</td>
<td>0.72</td>
</tr>
</tbody>
</table>

To generate a detailed analysis of the potential changes linked to instructional methods, I computed the number of respondents at various stages of the innovation-decision process for each SCI (Table 5.10). Responses with progression from SCI awareness rating of “1” (i.e., I have never heard of it) or “2” (i.e., I have heard of the name but do not know much else) to “3” (i.e., I am familiar but have not used it) represent participants with increased SCI understanding but who have not taken any action. A number of participants reported decline in some SCI methods after the intervention, the responses are shown in the “Regressed” column. Advancement to the implementation stage is indicated by the number of responses for SCI method not previously implemented in the pre-survey.
Table 5.10

Frequency responses for innovation-decision progression by SCI method

<table>
<thead>
<tr>
<th>SCI method</th>
<th>Comparison group (N = 15)</th>
<th>Treatment group (N = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No change (%)</td>
<td>Regressed (%)</td>
</tr>
<tr>
<td>Whole-class discussion (W)</td>
<td>7 (46.67)</td>
<td>5 (33.33)</td>
</tr>
<tr>
<td>Peer instruction (P)</td>
<td>6 (40.00)</td>
<td>3 (20.00)</td>
</tr>
<tr>
<td>Real-time polling (R)</td>
<td>6 (40.00)</td>
<td>3 (20.00)</td>
</tr>
<tr>
<td>Concept map (C)</td>
<td>5 (33.33)</td>
<td>2 (13.33)</td>
</tr>
<tr>
<td>Multiple drafts (D)</td>
<td>6 (40.00)</td>
<td>4 (26.67)</td>
</tr>
</tbody>
</table>

Table 5.10 shows that the majority of responses remained unchanged after the intervention. An average of 50% and 40% of the treatment and comparison group members, respectively retained their awareness scores for each SCI method. The concept map is the most readily embraced SCI approach for the comparison group with four participants advancing to the implementation stage. Examining the data from this perspective revealed that a greater number of participants in the comparison group demonstrated a decline in their SCI awareness ratings as compared to treatment group, especially for whole-class discussion method (W), followed by multiple drafts (D). Interviews with adjuncts during the needs assessment highlighted an incomplete understanding of SCI. Teaching strategies such as whole-class discussion and multiple drafts were methods commonly practiced but not necessarily implemented according to the constructivist approaches. The decline in the awareness ratings suggests the possibility of
cognitive dissonance experienced by adjuncts when confronted with new information inconsistent with their existing understanding (Gregoire, 2003). The higher number of decline observed for the whole-class discussion method contributed to the overall reduction in comparison group average score for the awareness measure.

Given the variation in SCI awareness and the adoption within each adjunct faculty, an investigation of individual responses may be helpful to understand the different rate of progression in the innovation decision process. I include data from the fidelity of implementation, specifically the number of notes taken in STELLAR and the treatment group participants’ mCoP membership type along with the corresponding post count, to determine a possible association between participant responsiveness and progression in the innovation decision-process. Table 5.1 lists the changes in awareness, attitudes, and implementation of SCI. For SCI awareness (“K” column), “+”, “-”, and “0” denote increase, decrease, and constant scores respectively for every SCI method. Similar notations were used to indicate the direction of change in TSES and ATI (“A” column). Progression to implementation stage (“I” column) is annotated with the SCI method that a participant reported to have implemented in a typical lesson during the post-survey. A blank cell in the “I” column is indicative of participants who have not progressed to the implementation stage.
Table 5.11

List of changes in awareness, attitudes, and implementation of SCI

<table>
<thead>
<tr>
<th>Participants</th>
<th>K: (\Delta W/P/R/C/D)</th>
<th>A: (\Delta TSES/ATI)</th>
<th>I: SCI method</th>
<th>Progression (0, K, A, or I)</th>
<th>Notes count in Stellar</th>
<th>mCoP membership (post count)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4M</td>
<td>+ + 0 0</td>
<td>- -</td>
<td>K</td>
<td>N.A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C7M</td>
<td>0 + 0 + 0</td>
<td>- -</td>
<td>K</td>
<td>N.A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C14M</td>
<td>0 0 0 - +</td>
<td>- -</td>
<td>K</td>
<td>N.A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2M</td>
<td>- + 0 0</td>
<td>+ +</td>
<td>K</td>
<td>N.A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C17M</td>
<td>0 0 0 + 0</td>
<td>++</td>
<td>A</td>
<td>20</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>C23M</td>
<td>0 0 0 0 -</td>
<td>++</td>
<td>A</td>
<td>N.A.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C9M</td>
<td>- 0 + -</td>
<td>0 -</td>
<td>W</td>
<td>I</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>C5M</td>
<td>- 0 0 + +</td>
<td>+ 0</td>
<td>W, C</td>
<td>I</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>C10M</td>
<td>0 0 + + 0</td>
<td>+ 0</td>
<td>R</td>
<td>I</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>C21F</td>
<td>+ + + + +</td>
<td>- +</td>
<td>W</td>
<td>I</td>
<td>1</td>
<td>N.A.</td>
</tr>
<tr>
<td>C16M</td>
<td>0 0 0 0 0</td>
<td>0 +</td>
<td>D</td>
<td>I</td>
<td>3</td>
<td>N.A.</td>
</tr>
<tr>
<td>C6F</td>
<td>0 + 0 - -</td>
<td>+ 0</td>
<td>R</td>
<td>I</td>
<td>4</td>
<td>N.A.</td>
</tr>
<tr>
<td>C11M</td>
<td>- - 0 0 0</td>
<td>++</td>
<td>C</td>
<td>I</td>
<td>N.A.</td>
<td></td>
</tr>
<tr>
<td>C13F</td>
<td>- - 0 + -</td>
<td>++</td>
<td>C</td>
<td>I</td>
<td>1</td>
<td>N.A.</td>
</tr>
<tr>
<td>C18F</td>
<td>0 0 0 0 +</td>
<td>++</td>
<td>C</td>
<td>I</td>
<td>*14</td>
<td>N.A.</td>
</tr>
<tr>
<td><strong>Treatment Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1M</td>
<td>0 - 0 0 0</td>
<td>- -</td>
<td>0</td>
<td>Insider (16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T11F</td>
<td>0 0 0 0 -</td>
<td>- 0</td>
<td>0</td>
<td>Peripheral (2)</td>
<td>15</td>
<td>Peripheral (2)</td>
</tr>
<tr>
<td>T7M</td>
<td>0 0 0 0 +</td>
<td>- -</td>
<td>K</td>
<td>Insider (12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3M</td>
<td>- - + + +</td>
<td>- +</td>
<td>K</td>
<td>Inbound (14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T15M</td>
<td>+ + + + +</td>
<td>+ -</td>
<td>K</td>
<td>Peripheral (6)</td>
<td>10</td>
<td>Peripheral (6)</td>
</tr>
<tr>
<td>T17F</td>
<td>0 + 0 0 0</td>
<td>+ -</td>
<td>K</td>
<td>Peripheral (7)</td>
<td>1</td>
<td>Peripheral (7)</td>
</tr>
<tr>
<td>T13F</td>
<td>0 0 - + 0</td>
<td>0 -</td>
<td>K</td>
<td>Peripheral (3)</td>
<td>4</td>
<td>Peripheral (3)</td>
</tr>
<tr>
<td>T14M</td>
<td>0 0 + 0 -</td>
<td>- -</td>
<td>K</td>
<td>Peripheral (0)</td>
<td>3</td>
<td>Peripheral (0)</td>
</tr>
<tr>
<td>T6M</td>
<td>0 + 0 0 -</td>
<td>++</td>
<td>A</td>
<td>Inbound (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T5M</td>
<td>0 + 0 0 0</td>
<td>- -</td>
<td>W, R</td>
<td>I</td>
<td>3</td>
<td>Peripheral (2)</td>
</tr>
<tr>
<td>T16F</td>
<td>0 0 0 0 +</td>
<td>- +</td>
<td>C, D</td>
<td>I</td>
<td>3</td>
<td>Peripheral (5)</td>
</tr>
<tr>
<td>T22M</td>
<td>+ + 0 0 0</td>
<td>0 0</td>
<td>W</td>
<td>I</td>
<td>17</td>
<td>Inbound (12)</td>
</tr>
<tr>
<td>T10M</td>
<td>0 0 0 + -</td>
<td>- 0</td>
<td>C</td>
<td>I</td>
<td>3</td>
<td>Inbound (10)</td>
</tr>
<tr>
<td>T20M</td>
<td>+ + 0 0 0</td>
<td>++</td>
<td>W, P</td>
<td>I</td>
<td>1</td>
<td>Inbound (5)</td>
</tr>
</tbody>
</table>

*Note. C18F took notes in MS document outside the STELLAR application*

Four clusters of participants emerge from the analysis above. They are participants who:

1. did not demonstrate progression in any of the SCI methods, denoted as “0”;
2. reported an increase in knowledge only for at least one SCI, denoted as “K”;
3. showed improvements in both TSES and ATI scores, denoted as “A”, and
4. adopted at least one new SCI strategy in a typical lesson in the post-intervention survey, denoted as “I”.

Based on the results in Table 5.11, no change was observed for two members in the treatment group, six reached the awareness stage only, while one and five participants respectively developed more favorable SCI attitude and claimed they adopted new SCI strategies. In the comparison group, all members indicated positive progression; four in awareness, two in attitude, and nine in SCI implementation. These results suggest that treatment group members are progressing at a slower pace than comparison group members towards SCI adoption. I examined the participant responsiveness data to delineate possible dependency of innovation decision on the level of mobile learning engagement in the sections below.

**Zero progression “0”**. Both the participants with zero progression came from the treatment group. One of them is a peripheral member in the mCoP (T11F), who appeared to be more engaged with STELLAR given her extensive note-taking, while the other (T1M), an insider mCoP member, was one of most active contributors in the chat group.

**Increase awareness only “K”**. All four members in the comparison group with awareness-only progression did not take any notes in STELLAR. While higher engagement in STELLAR appeared to be associated with progression toward improved attitudes and implementation in the comparison group, this trend was less apparent in the treatment group. On the contrary, one of the two most prolific note takers, T11F, reported no change in the innovation-decision indicators. Despite a greater number of STELLAR note-takers, there were more participants in the treatment group demonstrating progression up to only the awareness
stage while those in the comparison group reported higher levels of advancement in the innovation-decision process. Among those who maintained the knowledge stage in the mCoP, the majority were peripheral members. It is noted that the top posters in the mCoP (i.e., contributors of more than 10 posts), except for participant T22M, did not interact with the content in STELLAR.

**Improvements in attitudes only “A”**. Out of the five members in the comparison group with positive attitudinal scores, two did not report SCI implementation during the post-survey. With regards to the treatment group, two members reported improvements in both TSES and ATI; however, only one progressed to implementation. Interestingly, the more active inbound member (T6M) did not indicate any SCI adoption at the post-survey. It appears that active contribution in the mCoP alone without any engagement in STELLAR is not sufficient to support progression to the implementation stage.

**Self-reported implementation of SCI “I”**. Nine and five members in the comparison and treatment group, respectively, reported implementation of at least one new SCI after the mobile learning intervention. While there was no clear association across changes in SCI awareness, attitudinal, and implementation scores, participants who were more involved in the mobile learning activities seemed to be more likely to advance to the implementation stage. In the comparison group, five of the six note-takers indicated SCI adoption. Within the treatment group, all five members who reported new SCI implementation took notes in STELLAR and three were inbound members.

The data above suggest that comparison group participants who accessed only the self-paced learning in STELLAR are likely to possess a less complicated view of SCI than the treatment group members. In the absence of social interaction, comparison group members
MOBILE LEARNING FOR ADJUNCT FACULTY

depended only on video resources as validation for SCI experimentation. On the other hand, participation in the mCoP might have challenged treatment group members to re-examine their current understanding of SCI techniques (Jamil & Hamre, 2018). Hence, advancement only in the awareness stage was observed while changes in attitudinal and self-reported implementation remained stable as adjuncts grappled with the pedagogical nuances of SCI. As shall be seen in the following section, an investigation on the participants’ experience in the focus group unveiled possible explanations associated with the differential progression in innovation-decision between the groups.

**Research Question 3: Participants’ Experience**

Using the focus group discussion guide (Appendix H), I invited participants to describe their interactions with specific features in the mobile applications, how these features have shaped their thinking about SCI, and their participation levels in quantitative and qualitative terms.

**Comparison group members’ SCI thinking.** Focus group participants in the comparison group associated the usage of mobile phones with social interaction and consumption of entertaining content. When confronted with SCI micro courses, the adjuncts expressed their dilemma on whether to approach the resource as an attentive learning endeavor or as a quick browsing task. For example, C21F shared “For actual learning, I need to be sitting in front of my desktop to work on the materials and reflect on ways to implement the ideas. Getting this information on the phone is not serious learning.” C21F also admitted that she quickly clicked through some of the resources because they appeared irrelevant for the large classes that she teaches. In contrast, C6F chose to engage with the resource at home,
The SCI stuff is cognitively demanding, it is quite challenging to read on the go. I need to do deep thinking and take notes while reading, so it was not possible to go thorough [the content] on the bus or train. I tried to ask myself as I viewed the content - is there anything new that I can learn from here, so I re-watched several videos.

Comparison group members also emphasized the need for video captions, interview transcripts, and shorter video duration. Some participants were surprised that all the SCI videos were below five minutes and concluded that it felt longer because of the theoretical focus. This led to suggestions to showcase classroom episodes of SCI implementation in action instead of recorded presentations or interviews.

Regardless of the different approaches in accessing STELLAR, comparison group members noted that the micro courses clarified their understanding of SCI principles in general. C16M recounted how mobile learning has changed his conceptualization of SCI,

I used to teach in XYZ [another institution] which focused on problem-based learning. Students decide what they want to learn with a given problem... Different groups get to learn different things. That was my understanding of student-centered instruction. This course showed that SCI involves giving directions to students. There is still structure in SCI and it is not about letting students do whatever they want. I now see the importance of writing summary and key points as I go through my lessons - I think this is similar to the principles behind the concept mapping strategies.

Two specific SCI strategies, namely, real-time polling and concept mapping were well received. Focus group participants expressed intentions to infuse these strategies into their teaching although they also highlighted class size, rigidity of curriculum, and student readiness as obstacles. Excerpts from C18F’s comment below revealed feelings of affirmation for
pedagogical experimentation through mobile learning, yet concerns about class size were present,

> When I see [Name of instructor in video] demonstrated it in the videos … it’s like hurray! Someone else is doing it. I have always wanted to try [real-time] polling, but I have so many students in my class. I know that if I push myself, I could do it. I like the idea of using a set of cards because I don’t want to pay for the polling software.

Based on the findings in the focus group discussion above, there is evidence of shifts in the adjuncts’ thinking and attitude on SCI as they engaged with the videos and activities within STELLAR. Although there was no socialization opportunity for the comparison group members, the vicarious experience of peers successfully implementing SCI through videos served as a confirmation and confidence booster for adjuncts to proceed with experimentation. This observation is consistent with other research on video-based PD (Zhang, Lunderberg, Koehler, & Eberhardt, 2011), which concluded that watching a colleague’s video not only offered new perspective into personal teaching practices, but also enhanced the situatedness of the instructional technique for adoption and adaptation in the classroom.

Video-based PD within a community has added benefits of extending individual reflection to collaborative sensemaking with promising effects in the development of pedagogical content knowledge beyond addressing procedural concerns associated with a particular teaching strategy (Hawkins & Rogers, 2016). Members in the treatment group had the opportunity to interact with the video content individually within STELLAR and discussed their reflections in the mCoP environment over seven weeks of social interaction. In the next paragraphs, I examine the responses of the focus group for the treatment group to gather insights on how the collective reflection experience might shape their SCI thinking.
**Treatment group members’ SCI thinking.** Unlike the comparison group, treatment group participants did mention the cognitive load required for mobile learning. The opportunity to access two mobile applications likely resulted in participants expending attention on several mobile learning features including the socializing aspects of the mCoP, instead of dedicating their focus only on the video playback, which was the primary activity in STELLAR.

In their responses about mobile learning features that influenced their understanding of SCI, treatment group members appreciated the flexibility of both mobile applications in providing structured content as well as the social support. These sentiments were conveyed by T16F below:

> I like the flexibility of not having a fixed timeline for STELLAR. I progressed at my own pace in no particular sequence … usually I complete all the readings before watching the videos. I am mostly on my mobile for both Workplace and STELLAR … The responses I received for my Workplace posts were helpful, they reinforced my thinking about SCI and I felt supported. It is a convenient place to check out what my peers are doing.

This feedback revealed a similar theme with that of the comparison group reported above, highlighting the importance of supportive peers in validating pedagogical understanding.

While the comparison group members were able to articulate the changes in their SCI thinking and cited specific strategies in STELLAR that they found to be beneficial for their own practice, treatment group participants related frequently on their familiarity with SCI. For example, T9M shared, “These are strategies that I have been doing anyway because my course is very practical and not content heavy. About 70% of my lesson is peer-to-peer consultation. I do a lot of concept maps too.” Underlying T9M’s comments is the notion of incompatibility of SCI techniques with content delivery. The belief that SCI implementation is limiting content
coverage is consistent with other studies (Henderson & Dancy, 2012; Lund & Stains, 2015) and is indicative that adjuncts may be holding a transmission view of learning. Upon probing to reflect on differences in SCI thinking before and after their mobile learning journey, T1M elaborated, “I doubt there is significant change. At the end of each semester I reflect on how to improve my teaching for the next term. The content in STELLAR is basically confirming that my processes are correct”. Although T1M’s sentiments were likely to be representative only of himself, as an insider member with the highest post count, T1M’s views about SCI and his interaction with the mCoP members may have an influence on the rest of the treatment group participants.

In addition to the common obstacles of SCI that were also noted by the comparison group, several members in the treatment group felt that there was a mismatch of SCI approaches with the type of students they were teaching. T3M expressed his frustration regarding students’ lack of motivation, “These strategies depend on your student profile. If I can’t get students to even attend class, then the [SCI] methods will not solve the problem. The pre-requisite to SCI is students must be motivated first.” Similar views were echoed by another member, T8F, but she attributed cultural difference as a reason for students’ preference for didactic teaching, “The peer learning approach is very American context [sic]. Singapore students may not appreciate it. Students here expect you to cover all the content. If pre-reading is required, at least 90% of them will come unprepared. So, your role is not a facilitator but a lecturer”. T1M further emphasized his views on students as a factor

The SCI methods work but we cannot control the main variable for success - the students themselves. I avoid posting [in Workplace mCoP] continuously that SCI is not for our
students because I don’t want to sound negative. But it is important to be realistic and highlight the practicality of the strategies.

The focus group feedback above suggests that treatment group members may be wrestling with cognitive dissonance as they confronted with competing conceptions of best teaching practices. The requirement to publicly assess their own SCI transitioning status as part of the mCoP activity may have triggered a defensive mechanism in an attempt to preserve their professional identity and prevailing educational ideology, resulting in displacement of accountability for SCI practice to students (Delaney, 2015). As shall be discussed in the subsequent section, participants’ posts in the mCoP also surfaced evidence of lack of agency with respect to SCI implementation. It is worthwhile to note that all the treatment participants, with the exception of three members, reported that they were equally or more engaged with the Workplace mCoP as compared to the self-paced learning in STELLAR. Consequently, the three members (T8F, T12F, & T13F) were peripheral members in the mCoP and demonstrated limited interactions such as viewing of posts and clicking “Like” (Table 5.6).

Both groups benefited from the vicarious learning experience and highlighted challenges to SCI practices similar to those noted in the needs assessment. Comparison group members articulated changes in SCI thinking associated with specific strategies and reported intentions to experiment with concept maps and real-time polling. Although quantitative data indicated that the treatment group members’ main advancement is in the awareness phase of the innovation-decision process, the analysis above revealed that these members might be thinking that they are currently practicing some of the SCI methods but are questioning the effectiveness of these strategies in light of their beliefs about student motivation. Comments about student motivation and practicality of the strategies also suggest that the treatment group members are likely in the
process of reconciling their existing conceptions of SCI with those presented in the mobile learning.

There may be other interrelating factors affecting participants’ interaction with the mobile features that may or may not be connected to SCI thinking, the next section compares the members’ experience between the two groups to identify the differences in the level and quality of participation.

**Participation experience.** The focus group questions explored the participants’ experience in STELLAR and mCoP using quantitative and qualitative indicators. Questions regarding access frequency and average time spent were asked followed by exploration of specific interactions with features such as videos, polling, “Like” buttons, or comments (Appendix H). With regards to the qualitative aspects of the mobile learning experience, I analyzed focus group responses describing their rationale for activity choice, their motivation for participating in the study, and their perception of the most desirable characteristics of mobile learning experiences. The differences in participation experience between the comparison and treatment group is delineated in the paragraphs below.

**Difference in level of participation.** When asked about the average time spent on mobile learning, comparison group members indicated periodic sessions ranging from 30 minutes to two hours each time spanning across two to six weeks. Members frequently browsed the videos and articles but indicated preference for reading text. As reported in the previous section, internet bandwidth limitation and loading issues hindered on-demand access of the video resources. Treatment group members provided similar feedback on their experience with STELLAR features. However, they described their frequency of access to mobile learning as “touch and go” (T10M) and “whenever I was available” (T16F). These responses suggest that treatment group
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members did not have a routine for mobile learning. Analytics from STELLAR (Table 5.3) showed treatment group members completed fewer modules, as well as longer completion time (5.93 weeks) than that of the comparison group (3.40 weeks). There may be possible links between longer module completion time and the reduced TSES and ATI scores in the treatment group. However, further confirmation from the qualitative evidence is necessary.

**Difference in quality of participation.** Comparison group members spoke frequently about the importance of the visual design, course synopses, and content structure within STELLAR. As discussed in the implementation fidelity section, the inclusion of estimated activity time, section overview, and representational graphics provided helpful cues for participants to plan their learning (Mautone & Mayer, 2001). In contrast to the comparison group, treatment group members found their engagement with STELLAR to be less focused and rushed. T3M shared, “It was not a good experience because I was rushing through the content”. Likewise, T9M, “As for STELLAR, I was always trying to catch up.” However, they agreed that Workplace is a convenient place “to check out what my peers are doing” (T16F), and “to see whether I can do anything to help in the chat group” (T9M). Treatment group members attributed enjoyment in the mCoP to social interaction and access to community support. T3M explained,

> I chatted frequently. I wanted to see if anyone is posting [a situation] that I am currently facing. It is a quick and easy way to get solutions when people contribute. I like that I get to interact with anybody experiencing the same problems as me. Overall, I take this as a help-seeking platform, I feel less alone in the group.

Although some participants in the treatment group (T12F, T17F, T3M) also appreciated the systematic structure and visual icons in STELLAR, the majority felt restricted by the content organization of the micro courses. Contrasting views on the preferred structure revealed wide
ranging learning preferences. Two participants including T10M, suggested further modularization of the micro courses with independent content, “In STELLAR, I realized I had to go back to the ones I skipped because the content was linked. … but I didn’t want to. The content should be more bite-sized, about 3 minutes?”. On the other hand, T1M proposed a more integrated format, “Instead of modular, the content should be linked together to make individuals go back to review. If you can put everything in Workplace that will be even better, no need for us to go through two applications and this should generate more interactions.”

Treatment focus group participants were generally in favor of the free flow conversations and non-sequential activities characterized by the mCoP. However, not all the members found the social interactions in the chat group immediately relevant. T12F gave her reasons for finding STELLAR a more engaging experience than the mCoP, “It was good to listen to long videos and I am ok to put my headset on. I don’t need to keep interacting with the device or with other people. I am a passive learner, so I am happy to listen and watch.” For others, like T16F who were active in the early part of the mCoP intervention, they expressed a sense of disconnect midway,

I can’t relate to some of the comments in the Workplace because most of them were posting about problems with big class size. My class tends to be quite small with a maximum of 30 students. But I try to learn as one day I may be required to teach larger classes. I was active in the earlier weeks but not later into the semester as I was swamped with work.

Predictably, active mCoP members were the ones who felt constrained by the sequential presentation of the micro courses and showed clear preference for unstructured engagements.
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T10M commented, “I am more engaged in Workplace as it is casual. STELLAR is a little too formal.”

Notwithstanding the comparison group members’ initial decision to opt for self-paced learning instead of mCoP, the absence of social elements in STELLAR appeared to have a slight diminishing effect on the engagement quality. C16M indicated, “I have no idea who was participating in this project… I just wanted to complete the tasks given”. This sentiment was echoed by C17M, “I couldn’t see the notes by others. Few people posted in the video activity, so I didn’t think I needed to share anything”. Focus group participants nodded in agreement when C6F suggested, “it will be great to have competitive quizzes. I would enjoy a friendly competition to see how well I fared … something like a leaderboard would be great!” It appears that the types of social elements preferred by members are not only linked to learning preferences and goals, but also to intentions for progress tracking and public recognition of accomplishment (Hamson-Utley & Heyman, 2016). Comparison group members were less enthusiastic about social interactions that involve online sharing of their views and reflections about SCI. C10M expressed his anxiety with regards to such activity, “I prefer not to share my thoughts, what if someone challenge[s] my comments?”

The idea of course progress tracking was explored further in connection with the larger goals of career development and performance recognition. Members from both groups shared the need to establish clear alignment between mobile learning and professional growth or teaching contract renewals. Because of heavy teaching commitments in SPEI as well as in other institutions, participants grappled with tangible returns on time spent in mobile learning as well as the needed effort in changing their teaching practice. C6F shared her struggle,
Mobile learning gives the impression of a fun activity, so I probably won’t spend much
time on it because there are too many priorities in life. Other commitments will take over
and the online tasks will be neglected. But I would feel differently about a training
workshop. Seeing others learning in-person and participating in the workshop activities
gives me more reasons to get involved.

Building on the theme of PD and performance recognition, T10M suggested combining the
tracking of STELLAR and mCoP participation into a teaching portfolio.

It will be good if our participation in Workplace can be consolidated into a portfolio …

For example, how much have we posted and how will these contributions be recognized.

It will be nice to track the completion of the STELLAR micro courses too. SPEI can
aggregate this information and compare the learning progress of the lecturers. Why not
benchmark it with the student evaluation on teaching?

However, immediate concerns were raised by members about the extent of monitoring, in
particular, the conversations within mCoP. T8F indicated, “I’m not sure that I want every area of
my learning to be tracked, moderation is key. Particularly in Workplace, I want to be able to post
freely.”

Discussion

In this section, I discuss the findings in light of extant literature to offer interpretations
pertaining to the study outcomes. Following the convergent research design, results from the
separate analyses were triangulated to draw conclusions and illuminate implications for practice.

Different Strokes for Different Folks

The combined mobile learning experience in STELLAR and Workplace provided adjunct
faculty with a higher level of autonomy, context-sensitive interactions, and communication
options as noted in the treatment group participants’ feedback in the focus group. While adherence to Taylor et al.’s (2006) task model was more fully realized in the treatment group (Table 5.1), within group variation in the three dimensions suggested that participants gravitate to the learning approach that best match their preferences. Insider and inbound members in the mCoP enjoyed the social interactions in Workplace and found the activities beneficial but they were less engaged with the structured video content in STELLAR. On the contrary, less active participants (i.e., peripheral members in the mCoP) felt disconnected in the chat group and were unsure about the learning objectives of the mCoP. This observation is consistent with Jalil et al.’s (2009) postulation on leveraging affordances of multiple mobile applications to fulfill the pedagogical requirements of the task model. Uncertain correlations between transactional distance of technology-mediated learning and self-directedness of the participants (Garrison, 2000) also demonstrated the challenge of addressing wide-ranging learner profiles with instructional design. Accordingly, the provision of both STELLAR and Workplace offer choices and facilitate the appropriation of technology that best matches the participants’ personality characteristics.

**Top Posters in mCoP Affects Progression in Innovation-decision**

The evidence of Wenger’s learning trajectories in the mCoP is indicative of treatment group participants’ commitment to mutual engagement in the chat group. While progressive interactions anchored on a problem of practice hold potential to facilitate critical examination of teaching practice (Blumberg, 2016 & McKenna et al., 2016), mCoP chat analysis revealed recurring themes on student motivational issues. In the polling activity inquiring about the barriers to SCI adoption, seven out of 13 mCoP members indicated students’ unwillingness to be
participative and their lack of motivation as primary obstacles. A chat excerpt from T22M captured the sentiments,

I’d love to put my hand up in the air and say …yes, the problem rests with me, and here is what I am going to do to address it …You know, I’d feel really good about that, and fully in control, in a very intentional way. However, like others, to me the locus of the challenge lies much in the inner motivations of some students.

As highlighted in the literature review, adjuncts face administrative pressures and have limited latitude in curriculum matters (Kezar, 2013). The restrictive academic climate compounded by their precarious employment, which is heavily dependent on SETs, have possibly created a sense of disempowerment and deficit thinking about students (Garcia & Guerra, 2004).

It was shown that the top posters in the treatment group members did not take any notes in STELLAR suggesting that they may be less engaged with the SCI content (Table 5.7). It is likely that these adjuncts self-selected into the treatment group because of their preference for social learning. Without a good grounding on the SCI principals and transitioning techniques delineated in the micro courses, mCoP participants were unlikely to be able to discuss about the instructional transformation strategies. Diffusion of innovation studies emphasize a variety of communication options and repeated exposure to the knowledge about the innovation as a catalyst for people to move through the awareness stage (Henderson et al., 2012; Kardasz 2013). In a decentralized diffusion system, the successful propagation of innovation is dependent on the characteristics of the change agents within the peer networks (Rogers, 2003). Therefore, frequent expressions by mCoP top posters, including one of the insider members, on problematic students instead of the feasibility of SCI as a solution, might have attenuated the innovation-decision process. While this interpretation is consistent with the literature on the contributing role of
opinion leadership in diffusing innovation, causal inference cannot be established because of the statistically insignificance of the paired t-tests.

**Incentives for Mobile Learning and SCI Adoption**

The absence of tangible payoffs presents a challenge for sustaining mobile learning engagement and interest in SCI experimentation. As noted in the needs assessment, departmental norms and rigidity in the curriculum have shaped the adjunct’s instructional routine. Confronted with an optional innovation, adjuncts in both the comparison and treatment groups raised questions about the return of investment for time spent on mobile learning as well as effort in SCI infusion. Focus group participant, T12F, a peripheral member in the mCoP, shared her past experience with SCI,

> The micro course on real time polling activity actually reminded me of the teaching strategies that I don’t use anymore. I made use of technology in my teaching previously, but I gave up. The problem with technology is I can only engage a small group of students; most students would take advantage of the activities to just talk and not participate. It takes a lot of effort to get a full engagement. So, my focus is really on the content now.

With regards to the value of mCoP, her view is,

> Workplace is about posting your problem to seek help and channel for friendship. But I know where to seek help in the campus … so I don’t need to go online. My peers in the chat group are not my stakeholders so I will not tap on their resources to solve my work-related issues. This is [a] self-helping industry. Anyway, issues discussed are not situation specific, so the conversations are unlikely to be helpful enough.
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Although the previous section included positive views about help-seeking, the notion of the mCoP as a transactional space for receiving and offering help suggests adjuncts’ acquisitional approach to learning as opposed to learning as participation, which is the tenet of mCoP (Green, Ruutz, Houghton, & Hibbins, 2017). The large number of peripheral members hinted the differing expectations of members with regards to help-seeking, while the dominant discourse about student motivation in the mCoP underscores the known barriers to SCI adoption delineated in Chapter Three.

Dilemmas

   Polarized views surrounding the instructional design of the mobile applications (i.e., unstructured versus modular content presentation), conceptualization of professional learning (i.e., serious versus fun, acquisition versus participation), social learning metrics (i.e., unmoderated conversations versus tracked progress), as well as ethical considerations (i.e., maintaining student privacy and meaningful situation-specific support) suggest the different layers of concerns engendered from the interactions of personal preferences and the mobile learning dimensions. While the engagement patterns of the mCoP reflected Wenger’s trajectory and holds potential for continued organic growth, the contentions raised in the discussion above may privilege a minority of adjuncts, specifically those with similar personality characteristics like the insider or inbound mCoP members. In this regard, additional mobile learning features and the provision of multiple approaches to PD are necessary to integrate the range of complexities mentioned earlier in order to harness the full benefits of mCoP.

Implications for Practice

   The discussion above revealed new considerations for the design and implementation of mobile learning in relation to supporting student-centered teaching approaches. Although no
statistically significant results were obtained in the innovation-decision process for both comparison and treatment groups, within group variation as well as the qualitative differences in the participants’ experiences yielded insights that can be applied for faculty development initiatives in similar contexts.

**Task-focused Interactions to Increase Engagement**

Recommended features for mobile learning include visual presentation over text-based resources (Wang & Shen, 2012). Dynamic visuals such as videos are useful for demonstration of far-transfer principles and for illustration of procedural steps (Clark & Lyons, 2010). However, accompanying signaling text and commentaries are critical for directing attention and supporting the development of referential connections (Mayer & Sims, 1994). Because STELLAR incorporated primarily video interviews and classroom episodes, participants were required to invest significant cognitive effort to build the appropriate mental model for thinking about SCI. Accordingly, participants expressed dilemmas for accessing learning on-the-go and questioned the extent of productive learning amidst distractions from the surrounding environment. In this regard, task-focused interactions such as multiple-choice quizzes and gamification may be helpful to counter extraneous load (Churchill & Hedberg, 2008). The incorporation of game elements with social comparison features invites participants to be emotionally involved in the learning endeavor, which have been shown to positively influence time-to-proficiency of complex skills (Attri & Wu, 2015).

**Pre-requisites to mCoP Involvement**

The use of mobile technology is often associated with socializing and entertainment. If an individual’s perception about the use of social software conflict with the workplace communication norms, the desire to appear professional is likely to hinder expressive
interactions (Treem, Dailey, Pierce & Leonardi, 2015). This was evident in the mCoP posts that tended to indicate positive outcomes but not about the preparation work or ways to overcome challenges. Focus group discussions highlighted anxiety about peer criticism and the characterization of the adjunct career as a self-helping industry. Such perception is likely to moderate both the quantity and quality of participation. Having adjuncts who have experimented with SCI and are ready to share critical incidents related to SCI infusion may be a starting point to foster a more reflective conversation (Royle, Stager, & Traxler, 2014) because in-depth knowledge about essential features of SCI and possible adaptations for classroom use are necessary to support implementation (Henderson et al., 2012). By including only adjuncts who have progressed from the knowledge to decision stage, or those who demonstrated a favorable attitude towards SCI, as members of the private mCoP, the formation of a developmental instead of a self-preservation agenda is highly probable. The commitment to develop each other’s teaching practices helps to facilitate constructive knowledge exchange (Roxa & Martensson, 2015).

Alignment to Career Goals

With their precarious employment terms, it is typically in the interest of the adjuncts to conform to the institutional norms. From the perspective of organizational economics, adjuncts are more likely to invest efforts on administrative compliance to ensure continuity in their teaching appointments instead of taking unnecessary risks with pedagogical experimentation (Boyd, Crowson, & van Geel, 1994). Likewise, adjuncts struggled to find relevance in the serendipitous nature of mobile learning in their career. Focus group discussions revealed adjuncts’ desire to have their participation in the mCoP tracked for recognition towards contracts renewals and professional credentialing, although the extent of activity tracking differed among
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individuals. Integrating digital badging system into the mobile learning applications is one possibility to provide adjuncts the opportunity to customize their professional learning experience. Digital badges allow individuals to pick the content or learning tasks relevant to them for credentialing (Gamrat, Zimmerman, Dudek & Peck, 2014). To this end, the attachment of micro credentials, along with SETs and other re-appointment criteria, to the mobile learning endeavor, may be key to establishing a stronger connection between PD, teaching practices, and career goals.

Limitations

This study was conducted in a Singapore private education context comprising mainly of adjunct faculty members. The unique circumstances surrounding SPEI, such as the majority of long-serving adjuncts in the academic community, delivery of transnational curriculum with partner universities, the adoption of preset syllabi from partner institutions, and strong emphasis in operational efficiency with a focus on bottom-line results, present a unique culture of teaching and learning. Unlike other countries where private institutions may supplement the needs of undergraduate education, there is strong preference to pursue degree qualifications from the public universities in Singapore, because of affordable tuition rates, perceived ill repute, and stigmatization associated with private schools (Yeo & Ho, 2014). Confucian ideologies such as respect for authority and a strong emphasis on academic achievements continue to be core values that have been infused into the educational systems of Asian nations, including Singapore (Marginson, 2010). Taken together, the idea of shifting the responsibility of learning to the students and relinquishing teacher control in SCI practices may seem unacceptable. Both adjuncts and students are also likely to associate learning with attaining high scores in the examination, therefore the practice of SCI may be perceived as less relevant and accorded with
lower priority in the classroom. These cultural and institutional contexts have likely shaped the adjuncts’ response in this mobile learning research and the intervention results. Therefore, the interpretation of the data must be made in light of the present context. Replication of the study for adjunct populations in other higher education institutions is necessary before generalization of conclusions.

Adjuncts who responded to the email invitation to participate in this research were those who had attended previous professional learning events or had prior interactions with me because of my role as a faculty developer. Therefore, it is likely that their participation in this study stemmed from the friendship we shared but not necessarily due to their interest in SCI or their perceived value of mobile learning. While I am not involved in the re-appointment decision of the adjuncts, my position in the institution may have uncertain influence on the adjuncts’ interaction in the mCoP as well as their responses to the surveys and their feedback in the focus groups.

Another limitation is in the self-selection of members into comparison and treatment group. Instead of random sampling, adjuncts had the options to choose between self-paced learning or both self-paced and social learning in a private chat group. It is likely that treatment group members were more expressive and established in their teaching practice, as can be seen in the slightly higher percentage of participants with over fifteen years of teaching experience (Table 4.1) and higher group average of TSES and ATI scores (Table 5.9). Moreover, I asked the first few participants to invite fellow adjuncts that they were familiar with into the mCoP. While purposeful in following empirical evidence from the literature on the positive effects of prior friendships for increased participation and longevity of a community of practice (Cho, Gay, Davidson & Ingraffea, 2007; Pan et al., 2015), this sampling method had likely resulted in
systematic variation between the treatment and comparison group that may have masked the effects of the mCoP.

Finally, the seven-week mCoP intervention provided data only for the evaluation of proximal outcomes. Although empirical data showed positive impact after eight weeks of online PD (McKenna et al., 2016; Rienties et al., 2013), participants in this study took the first three weeks to get acquainted. Furthermore, not all of the participants completed the self-paced learning in STELLAR prior to mCoP participation as initially planned. Because mCoP members did not have the opportunity develop a plan for SCI infusion by following Blumberg’s (2009) rubric and van Merrienboer et al.’s instructional sequence, the problem-solving component intended for the mCoP intervention was not realized. A longitudinal study of the mCoP may yield a clearer picture on the progression of the innovation-decision process.

Conclusion

This intervention study attempted to examine the mobile learning experience of adjunct faculty members and the ways they engage with the two different mobile applications to support implementation of student-centered practices. I designed the intervention according to Taylor et al.’s (2006) task model approach to derive the pedagogical affordances of mobile learning. Fidelity data confirmed that the dimensions of the task model, namely, context, control, and communication, were better realized for participants who had the opportunity to engage with both self-paced (STELLAR) and community-based (mCoP) mobile applications respectively as compared to those who accessed only STELLAR. There was also evidence of Wenger’s learning trajectory in the engagement patterns of the mCoP, suggesting an acceptable level of participant responsiveness and potential for continued growth.
Although no statistically significant results were observed, the analysis of the innovation-decision process revealed that the mobile learning approach to PD has the potential to support student-centered practices among adjunct faculty. Adjuncts appreciated the on-demand access to pedagogical resources, the observational learning from peers, and the help-seeking channel in the online community space. As noted in the literature and needs assessment, adjuncts have limited access to PD opportunities and often rely on the lecture mode in their instructional practices. The provision of mobile learning is a first step to extend pedagogical support to adjuncts to explore a range of student-centered approaches. Self-paced learning through a mobile application showed promising effects in clarifying preconceived ideas surrounding student-centered instruction and fostering favorable attitudes for pedagogical experimentation. Combining experiences from both self-paced and social learning also showed similar potential. However, advancement towards the implementation stage was linked to having adequate engagement with pedagogical principles and gradual increasing participation in the community. Without theoretical grounding, interactions in the virtual community space may lack student-oriented themes with focus only on the problems of implementation. Nevertheless, conversations in the online space brought to light personal and organizational factors underpinning the prevailing instructional practices in higher education. These are critical data points for future research as well as for continuing the efforts in developing meaningful instructional support for adjunct faculty members.
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Appendix A: Needs Assessment Survey

Section A: Personal information
1. Name: _____________________
2. Email address: _______________
3. Which program(s) and modules do you teach? (please check all programs that apply and state the name of module you teach)
   - University of London, module: _________________
   - RMIT University, module: _________________
   - University at Buffalo, SUNY, module: _________________
   - University of Wollongong, module: _________________
   - Birmingham University, module: _________________
   - University of Warwick, module: _________________
   - Manchester University, module: _________________
   - SIM Diploma, module: ______________________

4. How many years of teaching experience (in and outside SIM)?
   - Less than 2 years
   - 2 to 5 years
   - 6 to 10 years
   - 11 to 15 years
   - More than 15 years

5. In considering your reasons for teaching part-time in SPEI, please indicate your agreement with the following statements.
   - Part-time teaching is a stepping-stone to full time teaching
   - Teaching part-time fits my current lifestyle
   - I have a full time professional career outside academia
   - I am waiting for an available full-time teaching position
   - Other: ________________________________

Please answer questions in sections B, C, D and E based on your teaching experience of one module. If you teach more than one module, please indicate your response based on the module you are most familiar with or teach most frequently.

6. Please state the module name here: _______________

Section B: Module information and teaching methods
7. What is the typical class size for this module?
   - Less than 20 students
   - 21 to 40 students
   - 41 to 80 students
   - 81 to 120 students
   - More than 120 students

8. What is the assessment structure for this module?
   *Final examination refers to written examination in a controlled environment*
   *Continuous assessment (CA) refers to project work, quizzes or assignments*
   - 100% weighting on final examination
   - Combination of CA and final examination, but weighting for final examination is higher than CA component
   - 50% examination, 50% CA
   - Weighting for CA component is higher than final examination
   - 100% CA

9. How often do you use the following teaching methods in your lesson:

<table>
<thead>
<tr>
<th>Method</th>
<th>I am not aware of this method (1)</th>
<th>I am aware but never used this method (2)</th>
<th>Once a term (3)</th>
<th>Two to five times a term (4)</th>
<th>Every other lesson (5)</th>
<th>Every lesson (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Lecture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>b) Whole class discussion</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>c) Small group work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>d) Peer instructions or peer review</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>e) Computer simulation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>f) Case studies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>g) Problem-based learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>h) Real-time polling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>i) Concept maps</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>j) Oral presentation by students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Section C: Perception of teaching strategies

10. How much do your fellow lecturers / head of programs / program directors expect you to use other instructional strategies in this subject other than lecturing?
   o None at all
   o Very little
   o Somewhat
   o Quite a bit
   o A great deal

To what extent are you able to:

<table>
<thead>
<tr>
<th></th>
<th>None at all (1)</th>
<th>Very little (2)</th>
<th>Somewhat (3)</th>
<th>Quite a bit (4)</th>
<th>A great deal (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11) Use a variety of assessment strategies?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12) Provide an alternative explanation or example when students are confused?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13) Ask your students good questions?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14) Implement alternative strategies (non-lecture methods) to guide student thinking?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15) Address the common misconceptions of students?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16) Structure activities to help students construct different representations of content knowledge using appropriate technology tools?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17) Design inquiry activities to guide students to make sense of the content knowledge with appropriate technology tools?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
## Section D: Teaching approaches

The questions below explore the way you go about teaching the module you specified in question 6 above.

<table>
<thead>
<tr>
<th></th>
<th>Rarely true for me (1)</th>
<th>Sometimes true for me (2)</th>
<th>True for me for about half the time (3)</th>
<th>Frequently true for me (4)</th>
<th>Almost always true for me (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18)</td>
<td>I feel that the assessment in this subject should offer opportunity for students to reveal their changed conceptual understanding of the subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19)</td>
<td>I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20)</td>
<td>I feel that it is better for students in this subject to generate their own notes rather than always copy mine</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21)</td>
<td>I feel a lot of teaching time in this subject should be used to question students’ ideas</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22)</td>
<td>In my interactions with students in this subject, I try to develop a conversation with them about the topics we are studying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23)</td>
<td>I set aside some teaching time so that the students can discuss among themselves, the difficulties that they encounter studying this subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24)</td>
<td>In teaching sessions in this subject, I use difficult or undefined examples to provoke debate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25)</td>
<td>I make available opportunities for students in this subject to discuss their changing understanding of the subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Section E: Preferred professional learning strategy

26) When required to make new change that you are not familiar with in your course content or delivery method, what do you usually do to prepare for the change?

<table>
<thead>
<tr>
<th></th>
<th>Never (1)</th>
<th>Hardly (2)</th>
<th>Sometimes (3)</th>
<th>Often (4)</th>
<th>All the time (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Experiment with my current class first</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b) Try to make sense of the change</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c) Talk to someone to get ideas</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d) Research online for ideas</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e) Anticipate potential problems and try to resolve it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f) Work on it as a project with another lecturer</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g) Attend a course (in-person)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h) Attend a course (online)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

27) Please describe the characteristics of good professional learning for educators. What is included in it?

_________________________________________________________________

Section F: Organizational support

Please indicate your agreement with the following statements:

As an associate lecturer in SPEI,

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Disagree (2)</th>
<th>Neither agree nor disagree (3)</th>
<th>Agree (4)</th>
<th>Strongly agree (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>28) I am satisfied with the campus support services (eg. Lecturer’s lounge, computers, internet and printing services, classroom teaching aids)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29) I have good working relationships with the administration team</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### Section G: Invitation to lesson observation (Optional)

As a follow up to this survey, you are invited to participate in a lesson observation. The researcher will observe a lesson of your choice to gain a better understanding of your teaching approaches. The duration of the observation is between 1.5 – 2 hours. The researcher will take notes throughout the observation and may have a post-observation discussion with you to clarify on the notes.

If you would like to participate in the lesson observation, please contact the researcher at maylyntan@spei.edu.sg or (65) XXXX-XXXX
### Appendix B: Research Questions and Variables Matrix for Needs Assessment Study

<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
<th>Variable</th>
<th>Indicator</th>
<th>Data analysis method</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1</td>
<td>To what extent are student-centered teaching strategies implemented by adjunct faculty?</td>
<td>Extent of SCI adoption</td>
<td>Number strategy implemented at least once in a term, List of strategy are: 1. lecture  2. whole-class discussion  3. small group work  4. peer instructions or peer review  5. computer simulation  6. case studies  7. problem-based learning  8. real-time polling  9. concept maps  10. oral presentation by students 11. interactive demonstration 12. formative assessment 13. students submit multiple drafts of written work Lesson observation Interviews</td>
<td>Descriptive statistics for each SCI</td>
</tr>
</tbody>
</table>
| RQ2 | What contextual factors influence adjunct faculty's adoption of student-centered teaching? | Contextual factors                | - **Assessment structures** - ratio of examination and course work component (100% exam, exam % > CA, 50% exam & CA, % CA > exam, 100% CA)  
- **Class size** grouping (<20, 21-40, 41–80, 81–120, >120 students)  
- **Departmental norms** - How much do your fellow lecturers / head of programs / program directors expect you to use other instructional strategies in this subject other than lecturing? (5 = a great deal, 4, 3, 2, 1= none at all)  
- **Student evaluation on teaching** – I am most concerned about the student evaluation in my teaching (Likert scale 5 = strongly agree, 4, 3, 2, 1 = strongly disagree)  
- **Working condition**  
  - I am satisfied with the campus support service  
  - I have good working relationships with the administration team  
  - I have opportunities to interact with other adjuncts  
  - I am given considerable flexibility in the way I teach a course  
  - Open comments: other feedback on work condition or support | One-way ANOVA  
Pearson correlation  
Thematic |
<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
<th>Variable</th>
<th>Indicator</th>
<th>Data analysis method</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ3</td>
<td>In what ways adjunct faculty’s perception of student-centered teaching influence their instructional decision?</td>
<td>Perception of SCI</td>
<td><strong>TSES instructional strategy subscale</strong></td>
<td>Pearson correlation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>To what extent are you able to: (5-point Likert scale)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• use a variety of assessment strategies?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• provide an alternative explanation or example when students are confused?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ask good questions to your students?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• implement alternative strategies (non-lecture methods) guide student thinking?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• address the common misconceptions of your students?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• structure activities to help students construct different representations of content knowledge using appropriate technology tools?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• design inquiry activities to guide students to make sense of the content knowledge with appropriate technology tools?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>ATI student-focus and conceptual change subscale</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>How true are the following statements? (5 point Likert scale)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. I feel that it is better for students in this subject to generate their own notes rather than always copy mine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. I feel a lot of teaching time in this subject should be used to question students' ideas</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. I set aside some teaching time so that the students can discuss among themselves, the difficulties that they encounter studying this subject</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7. In teaching sessions in this subject, I use difficult or undefined examples to provoke debate I make available opportunities for students in this subject to discuss their changing understanding of the subject</td>
<td></td>
</tr>
</tbody>
</table>
## MOBILE LEARNING FOR ADJUNCT FACULTY

<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
<th>Variable</th>
<th>Indicator</th>
<th>Data analysis method</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ4</td>
<td>How do adjunct faculty engage in professional learning?</td>
<td>Professional learning strategies</td>
<td>When required to make new change that you are not familiar with in your course content or delivery method, what do you usually do to prepare for the change? (choose of Likert rating: 1= Never, 2=Hardly, 3=Sometimes, 4=Often, 5=All the time) • Experiment with my current class first • Try to make sense of the change • Talk to someone to get ideas • Research online • Anticipate potential problems and trying to solve it • Work on it as a project • Attend a course (in-person) • Attend a course (online)</td>
<td>Descriptive statistics – frequency for responses “often” and “all the time”</td>
</tr>
</tbody>
</table>
## Appendix C: Lesson Observation Form and Interview Scripts

<table>
<thead>
<tr>
<th>Participant ID:</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation start time:</td>
<td>Module</td>
</tr>
<tr>
<td>Observation end time:</td>
<td></td>
</tr>
<tr>
<td><strong>Teaching strategies (please tick all applicable)</strong></td>
<td><strong>Indicate the time the strategy is implemented</strong></td>
</tr>
<tr>
<td>lecture</td>
<td></td>
</tr>
<tr>
<td>whole-class discussion</td>
<td></td>
</tr>
<tr>
<td>small group work</td>
<td></td>
</tr>
<tr>
<td>peer instructions or peer review</td>
<td></td>
</tr>
<tr>
<td>computer simulation</td>
<td></td>
</tr>
<tr>
<td>case studies</td>
<td></td>
</tr>
<tr>
<td>problem-based learning</td>
<td></td>
</tr>
<tr>
<td>real-time polling</td>
<td></td>
</tr>
<tr>
<td>concept maps</td>
<td></td>
</tr>
<tr>
<td>oral presentation by students</td>
<td></td>
</tr>
<tr>
<td>interactive demonstration</td>
<td></td>
</tr>
<tr>
<td>formative assessment students submit multiple drafts of written work</td>
<td></td>
</tr>
</tbody>
</table>

**Observation notes**

**Post lesson observation interview questions:**

1. Please describe the strategies you implemented in the lesson earlier. Which ones from the list below did you incorporate in your lesson?

   | lecture | whole-class discussion | small group work | peer instructions or peer review | computer simulation | case studies | problem-based learning |
   | real-time polling | concept maps | oral presentation by students | interactive demonstration | formative assessment | students submit multiple drafts of written work |

2. (If mismatch with researcher’s observation) Can you elaborate how did you implement (the strategy)?

3. I note that you indicated in the questionnaire you implement (pick 1 or 2 strategies not mentioned above). Can you share in what situation do you implement them?
**Appendix D: Coding Themes for Qualitative Comments on Organizational Support**

<table>
<thead>
<tr>
<th>No.</th>
<th>Comments</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The wifi can be challenging when students rely on it to submit their in-class assignments.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>2</td>
<td>Would very much prefer that the classroom size be proportional to the actual enrollment class size. For example, if the enrollment is 20 students, the lecture venue should be a classroom instead of a lecture theatre. The idea is to &quot;reduce&quot; the distance between the students and the teacher. This is especially true for my other class (RMIT/PIM-part time) where enrollment is usually less than 40 students.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>3</td>
<td>It is highly important for technology to be updated and available in the learning environment. Move away from lecture theatres to an environment that facilitates collaborative learning - SR environment. Immediate connectivity for students to push materials to screens and discuss what they are looking at.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>4</td>
<td>Provide lecture rooms that can be booked by lecturers for any additional tutorials for weaker students.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>5</td>
<td>While I feel that SIM is supportive of different styles of learning, the current classroom system and layout is more suited for traditional lecture. Students at a young age need more engagement and activity, which is hard to do when the tables and chairs are fixed.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>6</td>
<td>The non compulsory attendance and the lack of opportunities for students to present their work in front of the class takes away the learning concepts in university education.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>7</td>
<td>why are my teaching materials not allowed to be displayed and made available in the Library? this is deemed good reference to other students contemplating this course as well!</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>8</td>
<td>For each module, there should be a module leader and a team of lecturers. In this way, notes and good practices can be shared, and discussion of exam questions and answers can be conducted. This is for the common purpose of improving student learning and their pass rates.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>9</td>
<td>Lecture timings are too long. Should shorten to make the students'learning effective. It should not be more than 90 minutes per session.Lecturers to be provided with facilities in campus to help strike a good work-life balance.SIM should trust lecturers and treat them with respect and dignity, especially when contacting admin staff in their office.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>10</td>
<td>Should provide printing paper in the lounge instead of every lecturer has to collect and bring your own. I believe the latter actually requires more paper from SIM.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>11</td>
<td>More technical assistance</td>
<td>Infrastructure</td>
</tr>
</tbody>
</table>
### MOBILE LEARNING FOR ADJUNCT FACULTY

<table>
<thead>
<tr>
<th>No.</th>
<th>Comments</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1. Wifi is not easy to connect. Never been successful. 2. SPEI portal has SSL error in all main browsers - as a result many broken links.</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>13</td>
<td>As we are not full time staff, the time we spent on non-lecture activities such as attending meetings, helping students outside class, attending graduation ceremony, answering emails, preparing course notes, time tables, and so on are personal time that do not get paid by SIM. And yet we have to pay for car park. The rate per hour of teaching has not been revised for more than 20 years? Surely this is not right.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>14</td>
<td>Concern of shrinking income due to timeslot and program restrictions set up by management to overly risk manage the dependence on small and harmless group of dedicated lecturers</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>15</td>
<td>not personal touch - not proper orientation for new associate lecturer, mentor comes after a semester which you do not need</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>16</td>
<td>SIM wants Associates to be Relational, and Develop its Students as Human Beings. However, it deals with Associates mostly in Transactional ways, purely as Resources.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>17</td>
<td>I have seen the many changes since the first day of this BCM programme as an associate lecturer over last 19 years. I am the only sole longest serving lecturer. Many very good ones came and have left. At times i came in as stand-in lecturer for others who have left. From complimentary carpark, tea break and SIM AML to now without such considerations. From even bottled water to non working water coolers! It is withdrawing of such appreciations that shows a loss of identity and care towards/bystakeholders. The fees stood still and not raised for all these years. Do consider long serving members with some graciousness. Free attendance on AML which we take special days off and pride to attend and some simple appreciation go a long way as a social corporate recognition to/by all stakeholders. The organisation could put up some thoughts on human recognition as part of HR efforts.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>18</td>
<td>As a new associate lecturer, it would be beneficial to have an experienced &quot;mentor lecturer&quot; to interact with. Besides my contact with the RMIT lecturers in AUS, I have very minimal or no contact with other local lecturers who I can discuss or bounce ideas off.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>19</td>
<td>Perhaps, there can be funding for us to use for conferences, run talks, conduct research, or organize mini conferences/symposiums that would benefit both students and teaching staff?</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>No.</td>
<td>Comments</td>
<td>Theme</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>20</td>
<td>Please consider expanding facilities for SPEI lecturers. The rooms in lecturer lounge(s) is too small to support so many lecturers in their work! (a) increase no. of cubicles, desktop computers, scanners &amp; printers (b) upgrade desktop computer OS (c) a double-deck &quot;sick bed&quot; (I have seen lecturers suffering from sickness or poor time-tableing (1 lesson at 8.30am, 1 lesson at 7pm, interim period, snore at the sofa, or in cubicle - stopping other lectures from using cubicle to work) (d) larger lockers, so that those who teach large cohorts, can store their exam scripts safely. I once teach a cohort of 120++, and it is no joke having to carry them: - when in between marking, you need to pee in toilet, you carry them with you- you cannot store them in locker, so you carry 2 plastic bag of exam scripts, standing in Buses and MRTs, with no hands to hold on to the handgrips!</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>21</td>
<td>The current way that the module is run is unacceptable. One lecturer is expected to do cover and do the same amount of work as a 5 person team in RMIT. As an adjunct, I had to take leave just to settle issues that cropped up for the module, outside of my contact hours, which I am not paid for. Students do not get the proper guidance that they need for their assessments and RMIT refused to do anything about it until SIM was involved in the emails. Working condition for this module, especially with the RMIT programme director, was stressful and unproductive. He would not offer any solution except that the contract for SIM states that nothing would change to accommodate the large class and assessments. There was no heads up that this was going to happen before the semester began as everyone on the RMIT side was unavailable. This is experience working on the module involved u</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>22</td>
<td>Apart of the lecturer's workshop for self upgrade, I don't see SIM has shown any future plan for me as role of lecturer.</td>
<td>Institutional support and climate</td>
</tr>
<tr>
<td>23</td>
<td>Evaluations should not take in only the delivery of lessons but also the final results achieved by students. Often I have to put pressure on students to present higher quality work to ensure that their final results are good but this often leads to negative comments in evaluations. Must also ensure that lecturers who teach in the earlier first year subjects set the standards high so that when the students come into final year subjects they already have a good standard of performance.</td>
<td>Student evaluation</td>
</tr>
<tr>
<td>24</td>
<td>Students' Evaluation on Teaching (SET) is always a sensitive issue. Suggest to remove the top and bottom 5% of any quantitative feedback. Also, SET should be different for Qualitative (e.g. Marketing, HRM etc) and Quantitative (eg. Statistics, Finance, etc.) modules as the emphasis is not the same.</td>
<td>Student evaluation</td>
</tr>
<tr>
<td>25</td>
<td>Feedback given by students is very subjective and pretty much depends on level of maturity exhibited by students</td>
<td>Student evaluation</td>
</tr>
<tr>
<td>26</td>
<td>Student discipline is not taken seriously, esp for absent students. Little support from admin on this matter when we raise such complaints. Students who seldom attend classes should not be allowed to evaluate a lecturer's performance.</td>
<td>Student evaluation</td>
</tr>
<tr>
<td>No.</td>
<td>Comments</td>
<td>Theme</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>27</td>
<td>Students evaluation of lecturers does not truly reflect the capabilities of lecturers' good delivery of lessons. Students often give high marks to lecturers who give exam tips and help them score in exam. and assignments.</td>
<td>Student evaluation</td>
</tr>
<tr>
<td>28</td>
<td>The students' evaluation can put some pressure on the lecturer. It is important to communicate with the student on why I am adopting certain styles in teaching so that they can put the evaluation in that perspective. The feedback is valuable and I solicit them frequently even on an informal basis.</td>
<td>Student evaluation / positive</td>
</tr>
<tr>
<td>29</td>
<td>The survey should be carried out to the lecturers who flew in from another country to run the compact residential programme before the tutorial sessions. Instructions and material provided by these Uni Professors could be improved.</td>
<td>Other</td>
</tr>
<tr>
<td>30</td>
<td>So far so good.</td>
<td>Positive comments</td>
</tr>
<tr>
<td>31</td>
<td>I'm happy teaching here.</td>
<td>Positive comments</td>
</tr>
<tr>
<td>32</td>
<td>Generally, the working condition at SIM can be rated as just below premium relative to public tertiary institutions with govt. funding. Among the PEI, it is definitely the best I’d seen.</td>
<td>Positive comments</td>
</tr>
<tr>
<td>33</td>
<td>SIM treats its adjuncts very professionally, and makes a sincere and real effort to engage us. I truly appreciate that and feel part of the SIM family.</td>
<td>Positive comments</td>
</tr>
<tr>
<td>34</td>
<td>Thank you SIM!!</td>
<td>Positive comments</td>
</tr>
<tr>
<td>35</td>
<td>The computer support staff provide excellent service - they act immediately when the computer system is down.</td>
<td>Positive comments</td>
</tr>
<tr>
<td>36</td>
<td>SIM is great. And I have been around.</td>
<td>Positive comments</td>
</tr>
</tbody>
</table>
Appendix E: Causal Diagram

Moderator

mCoP membership

Process variables (fidelity measure)

Outcomes

Faculty profile

No (comparison)
micro courses only

Yes (treatment group)
mCoP + micro courses

Adherence to task model
Context, control & communication

Participant responsiveness
Wenger's learning trajectory
Peripheral, inbound, insider

Progression in
innovation-decision process

SCI awareness
Attitude towards SCI (TSES & ATI)
Self-reported implementation of SCI
### Appendix F: Summary Matrix

<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
<th>Variable</th>
<th>Indicator</th>
<th>Data collection timeline</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1</td>
<td>How has the implementation of the mCoP achieved program fidelity?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a</td>
<td>Did the mCoP delivery adhere to Taylor et al.’s (2006) task model approach to mobile learning?</td>
<td>Context, control, and communication</td>
<td>Focus group questions (Appendix H) 1 - 3</td>
<td>February 2018</td>
<td>Thematic codes based Taylor et al.’s (2006) task model. High fidelity = highest category in Frohberg et al., (2009) scale</td>
</tr>
<tr>
<td>1b</td>
<td>Did the mCoP members’ responsiveness to the program reflect Wenger’s learning trajectory?</td>
<td>Quantity of participation</td>
<td>Participant responsiveness data (Appendix G) items 1 – 6</td>
<td>Weekly from January 2018</td>
<td>Weekly descriptive statistics. High fidelity = increasing trend over the weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality of participation</td>
<td>Participant responsiveness data (Appendix G) items 7 – 12</td>
<td>Weekly from January 2018</td>
<td>Weekly chat analysis High fidelity = mCoP members progressed from peripheral to insider over the weeks</td>
</tr>
</tbody>
</table>
## MOBILE LEARNING FOR ADJUNCT FACULTY

<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
<th>Variable</th>
<th>Indicator</th>
<th>Data collection timeline</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>RQ2</strong> How does participation in mobile learning professional development (PD) influence adjunct faculty progression in Rogers’ (2003) innovation-decision stages with respect to implementing SCI?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Has mCoP participation increased SCI awareness level?</td>
<td>SCI awareness level</td>
<td>Online survey (Appendix I) item 9</td>
<td>November 2017 and February 2018</td>
<td>Paired T-test for pre and post intervention</td>
</tr>
<tr>
<td>2b</td>
<td>How has mCoP participation influenced the adjunct faculty attitude, in terms of their teaching self-efficacy and teaching conception of SCI?</td>
<td>Attitude towards SCI – Efficacy for conducting SCI</td>
<td>TSES instructional strategy subscale - Online survey (Appendix I) item 12 - 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attitude towards SCI – Teaching conception</td>
<td>ATI student-focus and conceptual change subscale - Online survey (Appendix I) item 20 - 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2c</td>
<td>Has mCoP participation increased self-reported SCI implementation?</td>
<td>SCI self-reported implementation</td>
<td>Online survey (Appendix I) item 10 and 11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## MOBILE LEARNING FOR ADJUNCT FACULTY

<table>
<thead>
<tr>
<th>No.</th>
<th>Research question</th>
<th>Variable</th>
<th>Indicator</th>
<th>Data collection timeline</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ3</td>
<td>What are the participants’ experiences with and without the mCoP?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>What features of the mobile learning with and without mCoP facilitate the advancement of adjunct decision-making towards SCI?</td>
<td>Not applicable</td>
<td>Focus group questions (Appendix H) 4 - 8</td>
<td>November 2017</td>
<td>Cross case analysis</td>
</tr>
<tr>
<td>3b</td>
<td>In what ways are the quantity and quality of participation different between the groups with and without mCoP?</td>
<td></td>
<td>Focus group questions (Appendix H) 9 - 14</td>
<td>November 2017</td>
<td></td>
</tr>
</tbody>
</table>
Appendix G: Participant Responsiveness Data Collection

Quantity of participation

Mobile application analytics from STELLAR (micro courses)
1. Login count
2. Number of micro courses enrolled
3. Number of micro courses completed

App analytics from Workplace (mCoP)
4. Login count
5. Number of posts
6. Number of artifacts contributed

Quality of participation (Preece & Schneiderman, 2009; Wenger, 2010)

Chat analysis for types of mCoP interaction:

Peripheral
7. “like” reaction to other’s posts,
8. brief acknowledgment or greetings

Inbound
9. substantial responses to discussion prompts
10. reflections
11. posts aligned the mCoP activities and requirements

Insider
12. posts that promote participation,
13. posts that develop relationships,
14. posts that initiate collaboration,
15. posts that organize or converge ideas, and
16. contribution of artifacts
Appendix H: Focus Group Questions

Part A: Adherence to task model - only for mCoP participants (Taylor et al., 2006)

Show the participants the three scales for the task model. They will be given five minutes to read the descriptors and indicate the category that best represented their experience. Participants will respond individually but may seek clarifications from the facilitator or discuss with other focus group participants.

Facilitator will initiate the discussion by getting participants to share their responses. Additional prompts shown below to guide the discussion.

1. Context: Interaction with the physical, social environment, or both contexts outside of the mCoP. Circle one of the categories below

<table>
<thead>
<tr>
<th>None</th>
<th>Physical</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>I interacted with the content within the mobile application only</td>
<td>I posted pictures from the surrounding and share with mCoP members</td>
<td>I posted questions to the mCoP to find quick answers when faced with a problem</td>
</tr>
</tbody>
</table>

Prompts for elaboration (only as a guide and depend on responses)

a) How did you include information from the physical surrounding to complete the learning activities?

b) Was there an occasion that you responded to a query not directly related to mCoP activity?

2. Control: Extent of control in the choosing what and when to learn or access the mCoP. Circle one of the categories below

<table>
<thead>
<tr>
<th>None</th>
<th>Some</th>
<th>Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>I had to follow all the instructions. It did not feel like I have a choice in the learning process.</td>
<td>I followed the recommended structure but I felt that I had some flexibility in the learning process.</td>
<td>I have full control in the process. I determined my learning goals and chose only what was relevant and progressed in my own pace.</td>
</tr>
</tbody>
</table>

Prompts for elaboration: only as a guide and depend on responses

a) In what ways were the learning goals set for you?

b) What were some learning activities that you decided how and when to participate?
3. Communication: Multiple options to interact with the content as well as communicate with one or many other participants of the mobile learning

<table>
<thead>
<tr>
<th>No one</th>
<th>Loose</th>
<th>Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>I did not interact with anyone. I just went through the course on my own</td>
<td>I chatted with one or two persons casually</td>
<td>I discussed with another person / several persons regularly and shared resources with each other</td>
</tr>
</tbody>
</table>

Prompts for elaboration: only as a guide and depend on responses

a) Who do you usually interact with in the mCoP?
b) Please describe how did you interact with the content or with other members.

**Part B: Participants experience (both mCoP and non-mCoP groups)**

Facilitator will invite participants to share their experience in the mCoP, specifically on how the mobile learning features support their SCI decision-making and their participation levels.

4. Please describe your learning experience in the mCoP and/or with the micro courses.
5. What features of the mCoP and/or the micro courses do you like and not like? Why? Can you give an example how you used the features to learn about SCI?
6. How is your thinking about SCI different before and after your experience with mCoP and/or micro courses?
7. What features in the mCoP and/or micro courses were helpful in shaping your thinking about SCI?
8. What features do you wish to be included in the future? Why?
9. Please describe how you participated in the mCoP / accessed the micro courses?
10. Where and when did you usually access the mCoP and/or micro courses?
11. Why did you choose to do (activities stated in Q9, e.g., “like” posts of others) but not (activities not stated, e.g., share resources)?
12. How would you describe an ideal mobile learning participation?
13. On average, how much time do you spend in the mCoP and/or accessing the micro courses in a week?
14. On average, how frequently do you:
   a. Read other’s message / *watch the videos / *read the articles
   b. Post new messages / *personal reflection
   c. Respond to messages
   d. Share resources
MOBILE LEARNING FOR ADJUNCT FACULTY

e. Encourage others to post
f. Summarize ideas from others
g. Work with others to develop resources for the group

* comparison group (non-mCoP) members need only to respond to these questions
Appendix I: Online Survey

Section A, B7, and B8 will be administered only once in the beginning of study but will match the corresponding respondent identity with post-intervention data.

Section A: Personal information
11. Name: _____________________
12. Email address: _______________
13. Which university program(s) and modules do you teach? (please check all programs that apply and state the name of module you teach)
   - University of London, module: _________________
   - RMIT University, module: _________________
   - University at Buffalo, SUNY, module: _________________
   - University of Wollongong, module: _________________
   - Birmingham University, module: _________________
   - University of Warwick, module: _________________
   - Manchester University, module: _________________
   - SIM Diploma, module: ____________________

14. How many years of teaching experience?
   - Less than 2 years
   - 2 to 5 years
   - 6 to 10 years
   - 11 to 15 years
   - More than 15 years

15. In considering your reasons for teaching part-time in SPEI, please indicate the statements that you agree with. Please choose all that apply.
   - Part-time teaching is a stepping-stone to full time teaching
   - Teaching part-time fits my current lifestyle
   - I have a full time professional career outside academia
   - I am waiting for an available full-time teaching position

Please answer questions in sections B, C, D and E based on your teaching experience of one module. If you teach more than one module, please indicate your response based on the module you teach most frequently or most familiar with.

16. Please state the module name here: _______________
Section B: Module information and teaching methods

17. What is the typical class size for this module?
   - Less than 20 students
   - 21 to 40 students
   - 41 to 80 students
   - 81 to 120 students
   - More than 120 students

18. What is the assessment structure for this module?
   *Final examination refers to written examination in a controlled environment*
   *Continuous assessment (CA) refers to project work, quizzes or assignments*
   - 100% weighting on final examination
   - Combination of CA and final examination, but weighting for final examination is higher than CA component
   - 50% examination, 50% CA
   - Weighting for CA component is higher than final examination
   - 100% CA

*B9 – to D27 will be administered before and after intervention*

19. For each teaching method, select one of the options which is true to you:

<table>
<thead>
<tr>
<th>Awareness in teaching methods below:</th>
<th>I have never heard of it</th>
<th>I have heard the name but don’t know much else</th>
<th>I am familiar but have not used it</th>
<th>In the past, I have used all or part of it, but I am no longer using it</th>
<th>I currently use all or part of it</th>
</tr>
</thead>
<tbody>
<tr>
<td>n) whole-class discussion</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>o) peer instructions or peer review</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>p) real-time polling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>q) concept maps</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>r) students submit multiple drafts of written work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
20. For each teaching method, select the frequency of implementation.

<table>
<thead>
<tr>
<th>Frequency of implementation for teaching methods below:</th>
<th>Once a term (1)</th>
<th>Two to five times a term (2)</th>
<th>Every other lesson (3)</th>
<th>Every lesson (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) whole-class discussion</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) peer instructions or peer review</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c) real-time polling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d) concept maps</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e) students submit multiple drafts of written work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

21. During a typical class session, which one(s) of the following teaching methods do you implement? (Please check all that applies) *(conditional setting in online form will automatically direct participants based on their responses in Q9)*

- [ ] Whole-class discussion
- [ ] Peer instruction
- [ ] Real time polling
- [ ] Multiple drafts
- [ ] Concept map
- [ ] Other, please state: ____________________
**Section C: Confidence in implementing student-centered teaching strategies** *(adapted from Tschannen-Moran & Woolfolk, 2004 TSES efficacy sub-scale for instructional practice)*

All questions below have the following 5-point Likert scale answer options. Please choose only 1 option for each question.

<table>
<thead>
<tr>
<th>Confidence level</th>
<th>None at all (1)</th>
<th>Very little (2)</th>
<th>Some what (3)</th>
<th>Quite a bit (4)</th>
<th>A great deal (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. How well can you respond to difficult questions from your students?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. How much can you gauge student comprehension of what you have taught</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. How confident are you to craft good questions for your students?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. How much can you do to adjust your lessons to the proper level for individual students?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. How much can you use a variety of assessment strategies?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27. How well can you provide an alternative explanation or example when students are confused?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28. How well can you implement alternative strategies in your classroom?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29. How well can you provide appropriate challenges for very capable students?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Section D: Approaches to teaching *(Trigwell & Prosser, 2004; Approaches to Teaching Inventory sub-scale for student oriented and conceptual change focused teaching)*

The questions below explore the way you go about teaching the module you specified in question 6 above.

All questions below have the following 5-point Likert scale answer options. Please choose only 1 option for each question.

<table>
<thead>
<tr>
<th>To what extent are the following statements true for you?</th>
<th>rarely</th>
<th>some</th>
<th>half the time</th>
<th>frequently</th>
<th>almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>32. I feel that it is better for students in this subject to generate their own notes rather than always copy mine</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33. I feel a lot of teaching time in this subject should be used to question students' ideas</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34. In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35. I set aside some teaching time so that the students can discuss among themselves, the difficulties that they encounter studying this subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36. In teaching sessions in this subject, I use difficult or undefined examples to provoke debate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37. I make available opportunities for students in this subject to discuss their changing understanding of the subject</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix J: Informed Consent & Survey

Johns Hopkins University
Homewood Institutional Review Board (HIRB)

Informed Consent Form

<table>
<thead>
<tr>
<th>Title:</th>
<th>Data Collection for Mobile Learning Professional Development</th>
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</thead>
<tbody>
<tr>
<td>Principal Investigator:</td>
<td>Carey Borkoski, Assistant Professor, JHU School of Education</td>
</tr>
<tr>
<td>Date:</td>
<td>12 June 2017</td>
</tr>
</tbody>
</table>

PURPOSE OF RESEARCH STUDY:
The purpose of this research study is to investigate in what ways SPEI adjunct faculty participation in a mobile learning professional development program support implementation of student-centered instruction (SCI) in the higher education classroom.

PROCEDURES:
The mobile learning will be delivered in SPEI developed application, named STELLAR and the Workplace mobile community platform which are part of the mobile packages available to all the associate lecturers in the institution. If you have not already installed the mobile applications, you may do so by going the SIMConnect portal using your SPEI mymail email address.

To participate in this study, you will be invited to enroll in five SCI micro courses in STELLAR and access the content at your own pace starting from 1 September 2017. If you who wish to extend your learning experience in a virtual community environment, you may request for an invitation to join a private group in the Workplace mobile community site from 11 September 2017 onwards.

Participants who opted to continue with the virtual community are the experimental group while the rest remain in the comparison group. Both the comparison and experimental groups will access the SCI micro courses at their own pace for eight weeks. But the experimental group will participate in weekly facilitated social learning activities from week 2 to week 8 within Workplace. The weekly social learning session comprises of a variety of online tasks which may take approximately two hours each week to complete. However, participants may progress at their own pace.

All participants will be invited to complete an online questionnaire in the beginning and end of the study. Each online questionnaire will take about 20 minutes to complete.

Some of the members in the experimental group will also be invited to participate in focus group at the end of study. If you agree to be take part in the focus group, the session will take about 1
MOBILE LEARNING FOR ADJUNCT FACULTY

hour of your time.

RISKS/DISCOMFORTS:
The risks associated with participation in this study are no greater than those encountered in daily life. Your decision to participate, decline, or withdraw will have no effect on your current or future relations with SPEI.

BENEFITS:
You will have flexible access to professional development resources on SCI on your mobile devices. If you are in the experimental group, you may receive support from your peers if you choose to implement SCI in your classroom.

This study may benefit society if the results lead to a better understanding of how supportive structures and experiences in mobile learning are linked to teaching practices.

VOLUNTARY PARTICIPATION AND RIGHT TO WITHDRAW:
Your participation in this study is entirely voluntary: You choose whether to participate. If you decide not to participate, there are no penalties, and you will not lose any benefits to which you would otherwise be entitled.

If you choose to participate in the study, you can stop your participation at any time, without any penalty or loss of benefits. At any point if you want to withdraw from the study, you may discontinue logging into the mobile applications or uninstall the applications from your mobile devices.

You may also choose to continue accessing the mobile application without taking part in the questionnaires or interview.

If we learn any new information during the study that could affect whether you want to continue participating, we will discuss this information with you.

CIRCUMSTANCES THAT COULD LEAD US TO END YOUR PARTICIPATION:
Under certain circumstances we may decide to end your participation before you have completed the study. Specifically, we may stop your participation if you have decided not to continue teaching with SPEI or there are technical restrictions that prevent access to the mobile learning applications.

There may also be other circumstances that would lead us to end your participation if we determine that it would be unsafe for you to continue in this study.

CONFIDENTIALITY:
Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including members of the Johns Hopkins University Homewood Institutional Review Board and officials from government agencies such as the National
Institutes of Health and the Office for Human Research Protections. (All of these people are required to keep your identity confidential.) Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

To understand how mobile learning experience may influence your thinking about SCI, the researcher will require access to your identity, online interactions, and chat content in the mobile applications. These records will be kept in a password protected virtual database which is only accessible by the researcher and the IT administrator of the system.

The results of this study will be reported in the doctoral dissertation but no identifiable information about you will be included. All data will be anonymized and presented only in aggregate.

**COSTS**
The are no cost to participate in this study.

**COMPENSATION:**
You will not receive any payment or other compensation for participating in this study.

**IF YOU HAVE QUESTIONS OR CONCERNS:**
You can ask questions about this research study now or at any time during the study, by talking to the researcher working with you or by calling Maylyn Tan at (65) 6248 0049

If you have questions about your rights as a research participant or feel that you have not been treated fairly, please call the Homewood Institutional Review Board at Johns Hopkins University at (410) 516-6580.

**IF YOU ARE HARMED BY PARTICIPATING IN THE STUDY:**
If you feel that you have been harmed in any way by participating in this study, please call Carey Borkoski, Assistant Professor (principal investigator of this study) at (410) 302 1589. Please also notify the Homewood Institutional Review Board at Johns Hopkins University at (410) 516-6580.

This study does not have any program for compensating or treating you for harm you may suffer as a result of your participation.

**SIGNATURES**

**WHAT YOUR SIGNATURE MEANS:**
Your signature below means that you understand the information in this consent form. Your signature also means that you agree to participate in the study.
By signing this consent form, you have not waived any legal rights you otherwise would have as a participant in a research study.

Participant's Signature

Date

Signature of Person Obtaining Consent
(Investigator or HIRB Approved Designee)

Date
## Appendix K: Timeline of Events and Activities

<table>
<thead>
<tr>
<th>Timeline</th>
<th>mCoP events</th>
<th>Sample activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>January Week 1</td>
<td>Start of five SCI micro courses in STELLAR</td>
<td>Self-pace access to videos, article, individual reflection</td>
</tr>
<tr>
<td>January Week 2</td>
<td>Start of mCoP private group in Workplace. Virtual welcome events and self-introduction (ongoing as the mCoP will continue to accept new members throughout the intervention)</td>
<td>Share four adjectives that best describe you.</td>
</tr>
<tr>
<td>January Week 3</td>
<td>Introduce Blumberg SCI infusion process through a worked-out example.</td>
<td>Read case vignette on how a professor used concept map to help student make sense of content instead of memorizing. Participants discuss the level of SCI transitioning.</td>
</tr>
<tr>
<td>January Week 4 – February Week 1</td>
<td>Identify the targeted SCI level based on the strategy (revers task). Evaluate solution to likely obstacles.</td>
<td><strong>Discussion:</strong> How do excellent students in your course engage with the content to make their own meaning out of it? Post a screenshot of your students’ concept map showing good and poor understanding</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Activity 1:</strong> Arrange in order the planning steps that the professor went through to assess her course status and plan to include concept map</td>
</tr>
<tr>
<td></td>
<td><strong>Activity 2:</strong> Poll for the most common classroom challenges</td>
<td><strong>Discussion 2:</strong> Share your experience on motivating students to learn.</td>
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<tr>
<td></td>
<td></td>
<td><strong>Activity 1:</strong> Choose from the following the strategy you would use to develop intrinsic motivation. Explain your answer in the post.</td>
</tr>
<tr>
<td>Timeline</td>
<td>mCoP events</td>
<td>Sample activity</td>
</tr>
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<tr>
<td>February</td>
<td></td>
<td><strong>Activity 2:</strong> The professor in the case cited her lack of trust on students to becoming intrinsically motivated as a major obstacle to SCI infusion. How might this be overcome? Choose from several options below or post your own answer</td>
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</table>
| Week 2        | Plan for SCI infusion for the common classroom challenge or self-assessment of own course (conventional task) | Choose a content area that you are most comfortable with, assess the SCI level against one or several components and discuss your plan for SCI infusion. Post the following in Google forms and share the link with the group: (a) Topic  
  (b) SCI component and current SCI level  
  (c) Target level of SCI and selected strategies  
  (d) Anticipated obstacles  
  (e) Resources or support needed to implement plan |
| February      |                                                                              | **Discussion 1:** Explain your choice of SCI component to focus on  
  **Discussion 2:** How are you using concept map / whole-class discussion / real-time polling / peer instruction / multiple drafts to achieve higher levels of SCI? |
| Week 3        | Continue from above                                                         | **Activity 1:** Review at least one person’s link and give suggestions how the plan might be improved  
  **Activity 2:** Chat with a fellow instructor not in this group who has been successful with the strategy you plan to implement. Share his/her recommendations here. |
| February      |                                                                              | **Discussion 3:** Review the submission of others. What are some common resources you can pull together to implement your SCI infusion plan?  
  **Activity 3:** How are others addressing your classroom challenge. Search for resources in the web and share it here  
  **Activity 4:** Conduct reciprocal lesson observation with another member in the group as you experiment with your chosen strategy. Post a resource or evidence of student work that is indicative of the level of SCI in the rubrics. |
Curriculum Vitae
Maylyn Tan

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Education
Teaching and Learning Division
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Singapore 599491
W: (65) 6248 0049
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EDUCATION

Johns Hopkins University – Baltimore, Maryland
EdD 2018

Melbourne University (Australia)
M.Ed 2006

Nanyang Technological University (Singapore)
BASc (Honours) in Materials Engineering 1999

PROFESSIONAL EXPERIENCE

1. Singapore Institute of Management (SIM GE)
   Manager / Educational Development & Innovation Jul 2012 – Dec 2014
   Head / Academic Development Jan 2015 - present

   Primary Responsibilities
   Manage faculty professional learning. Conduct training needs analysis, organize and facilitate training events, and develop technology-enabled learning solutions.

2. Marketing Institute of Singapore Training Centre (MISTC)
   Head / Curriculum & Academic Affairs Apr 2010 – Jun 2012

   Primary Responsibilities
   Established new faculty development function and pedagogical framework for the institution. Developed quality assurance processes for faculty appointment and teaching performance.
3. **Institute of Technical Education**  
   Lecturer & Instructional Designer  
   Jan 2002 – Mar 2010

   **Primary Responsibilities**  
   Teach vocational courses in electronics and semiconductor manufacturing. Design and develop interactive coursewares for online learning. Conducted program evaluation for educational technology projects. Facilitated on-boarding sessions and supervised field training for new lecturers.

4. **Hitachi Semiconductor Singapore**  
   Engineer / Senior Engineer  
   Jul 1999 – Oct 2001

   **Primary Responsibilities**  
   Started up 0.15µm 256Mb DRAM memory device from pilot to mass production. Conducted induction training.

**PROJECTS AND PRESENTATIONS (Selected)**

“Positive Outcomes of Team-based Learning in an Undergraduate Java Programming Course”, 10th annual International Conference on Education and New Learning Technologies, Palma de Mallorca, Spain, June 2018 (Co-author with Aaron Yeo)


“Investigating the Benefits of Mentoring-based Induction Program”, project supported by grant from the University of London, Center of Distance Education International Teaching and Research Awards 2014