

# Chapter 14

## Overcoming Teachers' Concerns—Where Are We in the Harnessing of Mobile Technology in K-12 Classrooms in Hong Kong?

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**Abstract** The emergence of “Post-PC” iPads and Galaxy tablets as global heavy-weights of mobile technologies have prompted a wave of educational technology advocates and policy makers to encourage teachers in the harnessing of mobile technology into K-12 classrooms. The actual level of implementation, however, has been reported as lagging far behind these research-led initiatives and slowed down the momentum envisaged by these policies, especially in many classrooms in the public sector. Teachers as individual innovation adopters are believed to play a crucial role in this innovation change process for the adoption of mobile technologies. To better understand the reluctance of teachers to adopt these mobile technologies into their classrooms, this study assessed teachers' concerns over harnessing mobile technology in Hong Kong public sector K-12 classrooms. A total of 159 teachers participated in this study. Utilising the Stage of Concern framework, a mixed-method approach was taken. Data collection compiled self-reported Stage of Concern Questionnaires and Open-Ended Concerns Statement opinion polls. Preliminary descriptive analysis showed that teachers experienced all five categorical concerns over harnessing mobile technology in teaching practices. The Information construct underscored a more intense area of concern. From the findings, implications in terms of accessibility, time, support-related interventions, leadership issues, and further suggested interventions are discussed.

### 14.1 Introduction

In recent years, the proliferation of mobile computing devices, especially “Post-PC” smartphones and tablets such as Apple iPads, have had a tremendous impact on different facets of Hong Kong society. A recent market research report (TNS 2011)

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established that a total of 17 percent, or one in six Hong Kong residents, owned an iPad, which is nearly six times the global average. Following suit, in order to maintain and advance the competitiveness of Hong Kong, the HKSAR government has implemented initiatives on harnessing the mobile technology in K-12 education: the government guideline (Education Bureau 2007) on the *Third Strategy on Information Technology in Education* (ITE3), named *Right Technology at the Right Time for the Right Task*, published by the Hong Kong Education Bureau, has recognised mobile learning as a trend; The most recent consultation document (Education Bureau 2014) of the forthcoming *Fourth Strategy on Information Technology in Education* (ITE4) took one step further by positioning the use of mobile technology as one of the most important strategies for students and teachers learning and teaching.

On the face of it, the Hong Kong public education system seems well-adapt at embracing the “Smart Age”. However, some recent reports pointed out that this only applies to a certain number of Direct Subsidy Scheme (DSS) Schools (Yau 2015). Indeed, when it comes to those Aided Schools, the most common and grass-roots pre-tertiary schools in the Hong Kong public sector, the actual implementation of the mobile technology in classrooms has been relatively slow so far. Anecdotal reports have revealed that many teachers are unmotivated to alter their current teaching practices and to integrate mobile technology into the classroom. There appears to be discrepancy between policy and reality of classroom implementation.

The introduction of mobile technologies into the classroom requires a process of change in learning and teaching. Teachers, the front line change adopters and gatekeepers (Fullan 2007), would inevitably have concerns over adopting change (Hord et al. 2006). While some researchers have explored and underscored the potential of introducing the mobile technology as an educational tool in situations within and beyond the confines of the classroom (Wang et al. 2014), the potential cannot be fully realised due to individual teacher’s concerns towards the mobile technology, which can result in resistance. Therefore, it is important to identify and understand individual concerns to reduce the possibility of resistance towards the implementation of mobile technology in Hong Kong K-12 classrooms.

## 14.2 Stages of Concern (SoC)

Concerns have been defined as “the composite representation of the feelings, pre-occupations, thoughts and considerations given to a particular innovation-based task or issue” (Hall et al. 1977, p. 5). Stages of Concern (SoC) (Hall and Hord 1987) was a framework developed by Hall and his colleagues to describe how people acclimate to change to pave the way for successful implementation of an innovation. The original SoC was construed in seven stages, namely *Awareness*, *Informational*, *Personal*, *Management*, *Consequence*, *Collaboration*, and *Refocusing*. While Hall and Hord’s (1987) SoC theory has been widely adopted in

many fields, Cheung and Yip (2004) refined the SoC model to five stages to better cater for educational change. More specifically, *Informational* stage was merged with the *Personal* stage; the *Consequence* and *Collaboration* stages were combined; the *Awareness* stage was deemed irrelevant; and an extra stage called *Evaluation* was introduced. In sum, Cheung and Yip's (2004) revised stages of concern for educational change were *Evaluation*, *Information*, *Management*, *Consequence* and *Refocusing*. At stage 1 (*Evaluation*), the teacher feels uncertain about the worthiness and fairness of the innovation as well as the feasibility of putting the innovation into school practice. At stage 2 (*Information*), the teacher is concerned with some general aspects of the innovation, such as its rationale, requirements for use and moderation mechanism. At stage 3 (*Management*), the teacher raises a number of questions about the tasks and processes of implementing innovation. At stage 4 (*Consequence*), the teacher is concerned with the impact of the innovation on student learning and his/her professional development. At stage 5 (*Refocusing*), the teacher is concerned with further developments of the innovation.

Both Hord et al. (2006) and Cheung (2002) indicated that the dimensions of concerns over innovations occur in a developmental direction: in general, early concerns (1–2) are more self-oriented; when these concerns are resolved, what emerged (3) are more task-oriented; finally, when self- and task concerns are largely resolved, the participants in change can focus on impact (4–5). However, Hord et al. (2006) also emphasised that individuals do not necessarily progress through the stages step-by-step, and that they do not necessarily begin the stages at the same time or move through the stages at the same pace. Rather, Cheung and Yip (2004) pointed out that it is possible for individual teachers to experience several SoC over the innovation concurrently, but perhaps with differential degrees of intensity.

To frame the adoption of innovation according to the concerns and doubts of individual teachers requires taking an individualistic approach. Cheung and Yip's (2004) revised SoC model can provide important insight about individual teachers to understand the stages individual teachers must go through before and when they are convinced about the innovation, and therefore being adopted in this study. It is believed that, after identifying, accessing and addressing the concerns of individual teachers over an innovation, based on their intense stage(s), there would be a greater likelihood that the innovation will be effectively implemented in a sustainable manner.

### 14.3 Research Question

The purpose of this study was to assess teachers' concerns about the introduction of an innovation, mobile technology, into the classroom.

The study sought to answer the research question: *What are teachers' concerns as they implement mobile technology into their teaching practices?*

The results of this study will be used to assist educators and policy makers in understanding concerns involved in the implementation and integration of the mobile technology in their schools and in teaching practices for better adoption through appropriate efforts and interventions.

## 14.4 Participants

This research study involved 159 teachers who attended our workshop on mobile learning that was jointly organised with the Education Bureau in December 2013. The teachers came from both public sector primary and secondary schools in Hong Kong. Their subject areas varied, as did their exposure to Information and Communication Technology (ICT). Convenience sampling was used. Prior to the study, all participants were given assurances on the confidentiality and anonymity of the data and its representations.

## 14.5 Research Design

A mixed-method approach (Creswell 2014) was adopted by assessing teachers' Stages of Concern for harnessing the mobile technology in their classrooms, from different perspectives. The instruments used were self-reporting, including a quantitative SoC Questionnaire and a qualitative Open-Ended Concerns Statement opinion poll.

For quantitative purposes, a customised 25-item SoC Questionnaire written in the Chinese language was devised, based on Cheung (2005)'s version that had been rigorously tested for validity and reliability, was used to measure teachers' stages of concern as they adopted the mobile technology into their teaching practice Table 14.1. This SoC Questionnaire comprised five sub-scales with five items each that corresponded to the five categorical stages of concerns as refined by Cheung and Yip (2004). All 25 items appeared in the instrument in a mixed order. Each item was accompanied by a five-point Likert-scale, ranging from 1 (not concerned) to 5 (strongly concerned). The SoC Questionnaire was conducted before our workshop and participants were asked to choose the appropriate level which best expressed their concerns: high scores indicating high concern, and low scores indicating low concern.

The results were further supported by the qualitative data collected from the Open-Ended Concerns Statement opinion poll, in which the most salient issues were asked in detail. Additional insight into teachers' concerns formulated in their own words were gathered.

The findings of the questionnaire and the opinion poll would indicate what type of interventions need to be implemented to enable teachers to move forward to the next stage in the change process.

**Table 14.1** The SoC questionnaire items (translated)

Stages	Item no.	Item
Evaluation	6	Whether it is worthwhile to promote mobile technology in my school
	8	Whether it is feasible to apply mobile technology in my school
	11	Whether I have the required knowledge and skills to use mobile technology
	16	Whether using mobile technology is better than other teaching tools
	21	Whether the government supports the use of mobile technology in school education
Information	2	How my role is supposed to change if I adopt mobile technology in my teaching practice
	7	How the use of mobile technology will affect my teaching workload
	9	Opportunities to learn from other teachers experience of using mobile technology in their teaching practice
	17	Knowing more instances for applying mobile technology in teaching
	22	Further provision of resource and support if I go on to apply mobile technology in my teaching practice
Management	3	Insufficiency of time to prepare and adjust my current pedagogy if adopting mobile technology
	12	How to assess my students' learning with mobile technology
	13	How to conduct teaching and learning activities with mobile technology more efficiently
	18	Extra time on dealing with non-pedagogical issues after the use of mobile technology in my teaching practice
	23	Insufficiency of time for students to reflect and summarise their learning after using mobile technology
Consequence	1	Whether my student would like to use mobile technology to learn
	4	My students attitude towards mobile technology
	14	Collaboration with other teachers to facilitate teaching with mobile technology
	19	Impact on my students after applying mobile technology in my teaching practice
	24	Reinforcing my students' understanding on their learning role in learning with mobile technology
Refocusing	5	The best use of mobile technology in my own teaching
	10	How to optimise teaching practice with mobile technology based on my own experience
	15	Revising mobile technology in education to improve its effectiveness
	20	How to modify teaching practice with mobile technology based on my students' feedback
	25	Exploring other teaching tools better than mobile technology

14.6 Results and Data Analysis

Although all of the 159 questionnaires were returned, 18 of those were partially completed. The data analysis was therefore based on 141 completed questionnaires. MATLAB, a statistics analysis computer programme, was used for quantitative data analysis. A reliability analysis was performed in the beginning. The Cronbach’s alphas (Cronbach 1951) of the five constructs were 0.665, 0.691, 0.701, 0.732 and 0.705, respectively. These results indicated an adequate level of reliability of the collected data.

Descriptive statistics was used to analyse the questionnaires. The mean of each SoC construct was computed, as Table 14.2 shows. The means ranged from 3.99 to 4.23, indicating that teachers experienced all five categorical concerns over harnessing the mobile technology in their teaching practices.

A one-way within subjects ANOVA analysis was conducted. The result indicated that differences among the five constructs’ means were statistically significant [ $F(4, 3520) = 12.582, p < 0.001$ ]. It can be seen that the mean of the *Information* concern was the greatest (4.23). Paired-samples t-tests (Nikulin 2001) verified that the mean of the *Information* concern was statistically different from the *Evaluation* construct’s ( $p\text{-value} = 1.2923e - 007, <0.05$ ), the *Management* construct’s ( $p\text{-value} = 1.3020e - 009, <0.05$ ), the *Consequence* construct’s ( $p\text{-value} \approx 0, <0.05$ ) and the *Refocusing* construct’s ( $p\text{-value} = 1.6738e - 011, <0.05$ ).

In sum, the statistical analysis identified that teachers experienced all five categorical concerns over harnessing the mobile technology in teaching practices, and among those, *Information* was the peak category, which appeared to be a more intense area of concern. It is worth noting that, considering the mean value of all SoC constructs were high and the *Information*’s distinctness from other constructs was roughly 0.2, such a difference was not necessarily substantive (Carver 1978).

Qualitative data from the Open-Ended Concerns Statement opinion poll was organised into table format within Microsoft Excel, a spreadsheet software. A thematic analysis framework was adopted. Among these statements, a number of concerns were flagged by the teachers. The main themes that emerged mostly mirrored those items described in the questionnaire.

**Table 14.2** Univariate descriptive statistics of the SoC constructs

Construct	Mean	Standard Deviation
Evaluation	4.06	0.77
Information	4.23	0.67
Management	4.03	0.73
Consequence	3.99	0.68
Refocusing	4.02	0.65

## 14.7 Preliminary Discussions and Implications for Practice

On the whole, the teachers' concurrent experience of all five categorical concerns about harnessing the mobile technology in teaching practices reflected a willingness to accept the mobile technology during the adoption and implementation process. The relatively higher intensity of the *Information* stage implied that teachers were still concerned with how mobile technology affected them individually and focused on its rationale, requirements for use and moderation mechanism. Frequently occurring concerns from the Concerns Statement opinion poll along with recommendations are put forward.

Accessibility issues could hinder teachers' decision to integrate mobile technology. Poor support networks can result in negative perceptions and ultimately resistance to mobile technology use. Concerns about the instability of the Wi-Fi network as a result of concurrent usage by students and teachers indicates to policy makers and educational leaders the need for better Wi-Fi infrastructure in all classrooms. In addition, in some schools, it was reported that the accessibility issue was still at the hardware level. This indicates that digital divide across schools in terms of accessibility still exists in Hong Kong. In these schools, despite advocacy from motivated teachers for mobile hardware, the financial cost for the school was still the fundamental barrier. As mobile devices become more ubiquitous among families with children, it is suggested that the Bring-Your-Own-Device (BYOD)<sup>1</sup> model (Johnson et al. 2013) is a plausible option to ensure maximum hardware accessibility. Even so, considering that many children in public schools are from low-income families that do not have the ability to shoulder the costs involved in the change with innovations, it is recommended that the government should dip deeper in order ensure that no student is left behind in the "Smart Age" just for financial reasons.

While addressing accessibility issues concerns, it is important not to use technology for technology's sake. Often in many classroom situations, mobile technology serves better as a supplement rather than replacement for traditional learning and teaching tools. The affordances (Gibson 1977; Norman 1988) of the mobile technology must be exploited in a more meaningful, contextually appropriate and efficient approach. After all, it is the combination of transformed learning design and sound pedagogical practices, rather than merely fancy technologies or technology know-how, that can effectively instigate a paradigm shift in the classroom.

Time constraint was another salient concern raised by teachers who are time deficient even without the use of technology in their existing teaching practice. Although time constraints can become an excuse for a certain group of teachers who are not technologically inclined, admittedly, with the use of technology, further time-consuming factors such as technological problems could be added.

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<sup>1</sup>A model based on the idea that students should be encouraged to bring their personal devices, especially smartphones and tablets, to class.

Just-in-time and on-going supports from the school ICT support team should be readily available to free up teachers' time so that the integration of mobile technology can become a meaningful venture.

Even with the help from ICT support teams or educational technologists, many teachers admitted that they felt nervous incorporating the mobile technology into their teaching practices. Thus, there is a pressing need for rigorous teacher training in the mobile technology in educational practices, such as pre-service and in-service professional development courses and even one-to-one consultations, while a minority of enthusiastic teachers may develop such practices through their own resources. This is a long-term process, which involves not only the development of teachers' digital literacy but also a paradigmatic shifting of how learning and teaching with mobile technology (Churchill et al. 2012; Churchill and Wang 2014). Alongside formal training, teachers should build up informal Communities of Practice (CoPs) (Wenger 1998) where they can exchange new ideas and collect feedback with local and remote partners. For example, social networking and mobile Instant Messaging (like WhatsApp and WeChat) groups can be formed by teachers and ICT professionals to identify and share educational Apps, and apply generic Apps to creative usages. The information gained from the CoPs may serve as a starting point for many. In conjunction with the community efforts, it is hoped that individual teachers' own "mobile pedagogy" can be developed to achieve their own pedagogical purposes and student learning outcomes.

Putting technical challenges aside, some teachers maintained a critical attitude toward the mobile technology integration because of classroom disciplinary concerns. A few of them anticipated that students would be over-excited during mobile technology-supported lessons, while the others questioned if the mobile technology in classrooms would lead to off-task behaviours and distractions because of its hyperconnectivity to social media. These concerns may sound legitimate. In order to tackle them, additional provisions allowing for disciplinary measures should be given extra attention. Teachers should offer guidance students to recognise that mobile tools are more than entertainment consumption "toys" and further scaffold students to apply the mobile technology to learning tasks. Nevertheless, from the viewpoint of a teacher, we must ask whose responsibility it is when there are distractions in the classroom, irrespective of whether technologies are incorporated or not. The optimal solution to avoid off-task behaviours and distractions may be to engage the learners with interesting learning activities to begin with.

Institutional leadership plays a crucial role as several teachers were concerned about "school support", where there are still bans on student's use of mobile devices in school. Exploration and action research on the educational use of mobile technology can be hampered by restrictive institutional policies and school culture. Therefore, there must be informed institutional leadership. Particularly, school leaders must recognise that educational change associated with mobile technology is not just for the "hard" outcomes (e.g. test result improvements) but more for the "soft" outcomes such as student's acquisition of twenty-first century skills (Bellanca and Brandt 2010). Best practices for teachers may only be achieved with the openness of school leaders to change. Unfortunately, at its current stage, such an



informed institutional leadership, which is needed to promote innovation with mobile technology, has not yet been widespread.

Current results are preliminary in nature. Contextual differences such as different academic disciplines may have an impact on the intensity of user concerns over the technology.

## 14.8 Conclusions

Change in K-12 education goes far beyond the introduction of innovations like the mobile technology, and is likely not to be a one-time “dog and pony show”. Rather, change with technology must begin with innovation practitioners - the teachers, although they will raise concerns. In this study, by acknowledging and giving serious attention to the intensive areas of concerns among teachers based on the SoC framework, perhaps more meaningful interventions can be taken, as suggested in the *Preliminary Discussions and Implications for Practice* section, to enable the change process to be directly relevant to the teacher's needs. Nevertheless, harnessing the potential of mobile technology in K-12 education will require a concerted effort on the part of all stakeholders to reduce the “discomfort” aspect of the change process and eventually achieve the ideal state of the innovation implementation: as Marshall (1995) stated, *adding wings to caterpillars does not create butterflies...Butterflies are created through transformation* (p. 11).

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