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CULTURAL AND REGIONAL PERSPECTIVES

The behavioral intentions of Hong Kong primary teachers in adopting educational technology

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Abstract The use of educational technology by Hong Kong primary school teachers has been realized by the government's long-term support to the technology infrastructure, professional training, technical support, and development of teaching resources in local primary schools. However, the high adoption rate may not reflect the willingness of teachers to accept technology for educational purposes. Presently, there is no existing research investigating in-service primary teachers' technology acceptance in Hong Kong. The aim of this study is to investigate teachers' acceptance of technology and the influencing factors behind their acceptance. This study takes a quantitative approach to investigate 185 primary teachers in Hong Kong using Structural Equation Modeling on a customized Technology Acceptance Model. The results suggest that contrary to common belief, perceived ease of use and perceived usefulness of the technology have little influence on behavioral intention of use in our research context. Rather, a pragmatic consideration of facilitating conditions is found to be a strong dominating factor. A context-specific interpretation of the results is provided. Implications on school policy are also discussed to provide insights for the development of educational technology.

Keywords Technology acceptance model · In-service primary teachers · ICT in teaching and learning · Educational technology in local context · Behavioral intentions

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Introduction

The potential benefits of information and communication technology (ICT) in learning and teaching have received significant attention in recent years. Both theoretical and empirical research have shown that ICT provides new opportunities as well as challenges in education. ICT in schools is commonly known as educational technology (Fadel and Lemke 2006; Roschelle et al. 2000; Schacter 1999), and schools worldwide are encouraged to continually invest in ICT to discover possible benefits and resolve existing challenges in teacher education and development (Valtonen et al. 2015). Educational technology is a broad term that may refer to the use of technology by teachers or students related to any purpose of education. Braak et al. (2004) classify teachers' technology use into two categories: supportive use versus classroom use. The former refers to the use of ICT for proactive and administrative teaching tasks such as teaching preparation. The latter refers to the use of ICT in the actual teaching and learning process.

A recent official report published by Hong Kong's Education Bureau (EDB) indicates that as many as 78 % of primary teachers in Hong Kong report being confident or very confident in their use of ICT for learning or teaching (EDB 2012). Moreover, 85 % used ICT for learning or teaching in the month before the survey. Regarding the details of usage, 41 % report that they have used emerging technology such as Web 2.0, and 59 % have used free resources. In addition, 47 % have incorporated ICT into the learning activities of their students. These data indicate that teachers in Hong Kong are generally confident and experienced with ICT in education. The same report also concludes that schools are well equipped with corresponding ICT hardware and software infrastructure, personnel training, and human resources.

Despite such results, statistics provide no information about the willingness of teachers to use ICT in their teaching (i.e., teachers' technology acceptance). The high adoption rate may well be the result of a policy mandate within schools, as indicated by Teo (2015). In fact, research suggests that regarding voluntary use, teachers are selective in ICT adoption based on pragmatic considerations such as time and resources, as they consider some ICT as unnecessary, time-consuming, inflexible, and difficult to use (West et al. 2006). For example, teachers with heavy workloads may be more reluctant to introduce ICT in their teaching regardless of its potential future benefits. The workload issue is particularly relevant in Hong Kong. An earlier study suggests that heavy workloads in local primary schools discourage teachers from making use of ICT in teaching (Hung et al. 2000). A more recent and large-scale study on curriculum reform in Hong Kong suggests that teachers' heavy workloads, arising from regular teaching loads, administrative burdens, and professional training requirements, is a major hindering factor on reform progress (Cheung and Wong 2012). The curriculum reform was themed "Learning to Learn" and the use of ICT for interactive learning was specified as one of the four key tasks by schools to achieve this objective (EDB 2001).

Indeed, there are various possible factors influencing technology acceptance or non-acceptance by teachers in Hong Kong, with workload being a prominent candidate. The extent to which technology has been effectively implemented and adopted for teaching and learning depends heavily on the level of teachers' acceptance (Teo 2014). Research shows that teachers still possess their own volition regarding intention and actual usage of technology within their teaching space, even though the school might integrate technology as a mandatory usage (Yang and Huang 2008). If school management boards decide to promote the use of ICT by teachers in their daily teaching (either mandatory or voluntary),

it is necessary to identify any influencing factors and their inter-relations regarding teachers' acceptance level of educational technology. Thus, it is vital to investigate teachers' acceptance of technology and the factors behind their acceptance before the adoption of any educational technology.

The present study aims to answer two major research questions. First, to what extent do in-service primary teachers in Hong Kong accept the use of ICTs in their own teaching? Second, what are the major factors affecting their acceptance or non-acceptance in the local context, and why? These research questions have not been adequately addressed within a cultural context in existing literature. Although previous research has concerned technology acceptance levels in a group of pre-service teachers in Hong Kong (Wong 2015), those results may not be generalizable to the case of in-service teachers in a local context because the two groups may have very different perspectives (Teo 2015; Wright and Wilson 2005). Thus, the main contribution of this study is to extend existing research on technology acceptance among in-service primary school teachers in Hong Kong.

Theoretical background and literature review

Acceptance versus adoption

First, it is crucial to distinguish the different concepts defining technology acceptance and technology adoption. Renaud and Biljon (2008) define technology adoption as a process in which a person first becomes aware of technology, then embraces it, and finally makes full use of it. Occasionally the term integration is used in place of adoption (e.g., Sang et al. 2011), loosely defined as the use of computers in the classroom to teach, carry out familiar activities more reliably and productively, and to develop students' thinking skills (Hew and Brush 2007). The present study does not distinguish between adoption and integration because this is not the focus of our discussion.

In contrast, technology acceptance is an attitude towards technology influenced by various factors. Acceptance of a technology refers to an individual's willingness to use a technology for which it was designed (Teo 2014). In the case of teachers' technology acceptance, it is not related to whether teachers will actually use the technology in teaching, but instead whether they will accept or actively oppose the introduction or implementation of the technology (Jaffee 1998). This study focuses on the acceptance of technology by teachers, defined as their behavioral intention to use technology in their teaching. Their actual adoption for educational purposes is beyond the scope of this study.

There is also a distinction between individual and organizational levels in the acceptance and adoption of technology, which refers to the acceptance and adoption of technology as a personal decision and as a policy in an organization, respectively (Jeyaraj et al. 2006). The current study concerns the individual perspective rather than the organizational perspective.

Theoretical models of technology acceptance and adoption

The identification of important predictors of technology acceptance or adoption is operationalized through quantitative statistical models depicting relations between various independent and dependent variables. A survey of two decades of empirical studies between 1983 and 2003 by Jeyaraj et al. (2006) identifies ten theories regarding technology

acceptance or adoption research, eight of which address individual acceptance/adoption. Among these theories are the Theory of Reasoned Action (TRA) (Fishbein and Ajzen 1975), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM) (Davis 1989), Technology Acceptance Model II (TAM2) (Venkatesh and Davis 2000), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003).

TRA is among the earliest of such models. It makes the fundamental assumption that human behavior is a result of behavioral intention, which in turn depends on subjective norms and the individual's attitude towards the behavior. A subjective norm concerns an individual's perception of a behavior, and perceived social pressure from important others to engage or not to engage in that behavior (Fishbein and Ajzen 1975). Attitude refers to an individual's predisposition to respond favorably or unfavorably to an object, person, or event (Ajzen 1989). TPB is an extension of TRA, including perceived behavioral control as a factor of attitude. Perceived behavioral control refers to people's perceptions regarding how well they may perform the behavior (Ajzen 1991).

TAM is one of the most widely tested models (Venkatesh et al. 2007). Based on TRA, it adapts that theory in the context of individual acceptance of ICT. In TAM, an individual's behavioral intention to use technology is directly impacted by his/her attitude, and attitude is predicted by two major beliefs held by the individual concerned: perceived usefulness and perceived ease of use. Perceived usefulness measures "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320). Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320). It is also postulated that perceived usefulness has a direct impact on behavioral intention and perceived ease of use has a direct impact on perceived usefulness. Finally, TAM also allows other "external" variables (relative to the aforementioned factors) to measure the determinants of perceived usefulness and perceived ease of use (Davis 1989).

TAM is considered as a parsimonious model (Legris et al. 2003; Teo et al. 2009), yet this parsimony is criticized by some authors for its inability to give practical advice on how to improve the perceived usefulness and perceived ease of use of technology (Venkatesh et al. 2007). For this reason, TAM was extended (TAM2) to systematically investigate the determinants of perceived usefulness (Venkatesh and Davis 2000) and perceived ease of use (Venkatesh 2000) to provide a more practical basis for intervention. These extensions were integrated into TAM3 (Venkatesh and Bala 2008). Another line of thought is apparent in Venkatesh et al. (2003), where the most salient characteristics of eight of the most common theoretical frameworks (including TRA, TPB, and TAM) were integrated into a unified model named the Unified Theory of Acceptance and Use of Technology (UTAUT).

In this study, we use a TAM research model because it is one of the most widely tested models. Furthermore, given that the focus of this study is to investigate technology acceptance in a particular cultural context rather than the theoretical development of TAM, we intend to rely on this well-established model in our investigation. Variations of external constructs have been introduced in various research (e.g., Perceived Ease of Use and Usability, PEUU; Holden and Rada 2011). Based on Teo (2011) for instance, five significant constructs are included in the modeling of in-service teachers' behavioral intention to use technology: perceived usefulness, perceived ease of use, attitude towards computer use, subjective norm, and facilitating conditions. According to Teo and Zhou (2014), it is possible that the different results from TAM models are due to external constructs that are population-dependent and situation based, and might not be generalizable depending on different populations. Thus, our study has considered and adopted four common external variables in the model building stage, which are facilitating conditions, self-efficacy,

computer anxiety, and subjective norm. Descriptions and explanations on these external constructs are provided below.

Facilitating conditions

Facilitating conditions are the perceived environmental factors that impede or facilitate the performance of a particular behavior (Thompson et al. 1991). Common conditions generally include the resources necessary to use educational technology, corresponding knowledge, equipment availability, fitness of technology into the workflow, and perceived technical support available for assistance in case of problems and difficulties (Groves and Zemel 2000; Teo 2010). A lack of resources, which may include the unavailability of technology or insufficient or inconvenient access, may hinder teachers from using such technology (Hew and Brush 2007). It has been shown that there is a strong relation between technology adoption and the availability of computers in the classroom (Inan and Lowther 2010). The lack of knowledge regarding how to use technology in teaching is another major barrier of adoption (Hew and Brush 2007; Inan and Lowther 2010). This knowledge is not limited to technical knowledge to operate the particular technology, but also includes the knowledge to integrate technology in the pedagogy (Hughes 2005).

A technology fits well into the workflow if it does not require substantial change to that workflow. This concept relates to the compatibility concept in Moore and Benbasat (1991), which describes how well the technology is perceived to be consistent with existing values, needs, and experiences. Finally, the importance of technical support is also recognized in a number of studies (Cheung and Vogel 2013; Inan and Lowther 2010; Ngai et al. 2007). Teachers feel more ready to adopt technology if technical and administrative support is available (Davis et al. 2009; Sandholtz and Reilly 2004). The availability of technical support is found to affect both perceived ease of use and perceived usefulness (Ngai et al. 2007).

Self-efficacy, computer anxiety, and subjective norm

Self-efficacy concerns "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura 1997, p. 3). Computer self-efficacy refers to an individual's belief in his/her own ability to use computers to perform computing tasks (Compeau and Higgins 1995). It is also suggested by some to influence perceive ease of use and behavioral intention (Gong et al. 2004; Lee et al. 2013; Ong et al. 2004). Others have studied self-efficacy concerning a particular technology. For example, Igbaria (1995) use Internet self-efficacy as a specialized construct of computer self-efficacy in the domain of the World Wide Web. Holden and Rada (2011) use technology self-efficacy in place of computer self-efficacy. In the current study, self-efficacy specifically refers to the use of educational technology to complete a teaching and learning task.

Computer anxiety is an anchoring belief that inhibits the formation of a positive perception of ease of use (Venkatesh 2000). This is operationalized through a teacher's fear of using educational technology in general, the fear for causing problems that the teacher cannot handle, and the subsequent negative effects brought to the teaching. Computer anxiety is a factor in the perceived ease of use in TAM3 (Venkatesh and Bala 2008).

Finally, subjective norm (as defined above) concerns individuals' perceptions regarding important others' desires for them to engage (or not) in a particular behavior (Fishbein and Ajzen 1975). A subjective norm is a determinant of perceived usefulness in TAM2 and

TAM3. It is also thought to have a direct effect on behavioral intention in these models (Venkatesh and Bala 2008).

Barriers to technology adoption

The literature suggests a number of barriers to technology adoption by teachers. Ertmer (1999) classifies these barriers as either external (first-order) or internal (second-order). External barriers refer to the key obstacles caused by external conditions such as the availability of Internet access, whereas internal barriers are considered more fundamental, for instance, the internal beliefs of teachers. Hew and Brush (2007) introduce another classification system of teachers' technology adoption. They identify resources, institution, subject culture, attitudes and beliefs, knowledge and skills, and assessment as the major barriers faced by K-12 schools when integrating technology into the curriculum. In addition, Robertson et al. (1996) state that teachers' resistance to computers use may arise from a resistance to change, resistance to outside intervention, time management, lack of support, their own perceptions on technology, and other personal and psychological factors. Based on these key findings, the different classifications reveal that the factors of technology adoption are multidimensional (i.e., arising from the individual characteristics of the teacher, the technology itself, and the context/environment; Straub 2009), and they concern various different levels (e.g., individual, school, and the whole education system; Petko 2012). Thus, it is essential for educators to identify the major factors influencing their technology acceptance, as this in turn affects their intention to adopt technology (Kim and Garrison 2009).

Research on teachers' beliefs and technology acceptance

Although the interplay of the above factors is a complex one, Petko (2012) observes a broad consensus that emphasizes teachers' individual qualities, in particular their pedagogical beliefs. Mumtaz (2000) points out that without focusing on the teachers' own theories and beliefs about teaching and learning, ICT integration may be limited. Straub (2009) suggests that individuals construct unique but malleable perceptions of technology that influence the adoption process, while these perceptions are subject to the cognitive, emotional, and contextual concerns of the teachers and must be addressed. Others suggest that teachers' attitudes and beliefs are the most important factors for successful ICT integration (Ertmer 2005; Petko 2012). Sang et al. (2011) call for the need to consider the internal barriers faced by the teachers.

The effects of teachers' beliefs on adoption are reflected through their technology acceptance, represented by their behavioral intention to adopt a technology. Although acceptance is not the only factor leading to adoption, it is nevertheless an important one. For instance, Jeyaraj et al. (2006), in reviewing 48 empirical studies on individual adoption of technology, conclude that behavioral intention is among the best predictors of individual adoption.

Technology acceptance across contexts and cultures

TAM is generalizable across various settings (Venkatesh et al. 2007). Furthermore, empirical studies on technology acceptance have identified some universal relations across these studies. For instance, in a review of 22 TAM-based studies (covering 28

measurements), Legris et al. (2003) found that the impacts of perceived usefulness on attitude, perceived usefulness on behavioral intention, and the perceived ease of use on perceived usefulness were supported in over 80 % of the models tested.

However, a closer inspection of the results shows that these universal relations vary considerably in strength across studies of different cultures and contexts, leading to quite different conclusions. Various authors point out that technology acceptance can be affected by culture (Chen et al. 1999; Sang et al. 2011; Teo et al. 2009). Empirically, cross-cultural studies show that both national and professional culture can have a significant influence on technology acceptance (Nistor et al. 2012; Sánchez-Franco et al. 2009; Sang et al. 2011). Even studies conducted in similar cultural settings produce different results. A study that surveyed 152 teachers in Hong Kong on their acceptance of e-learning technology in general shows that perceived ease of use is the key factor to behavioral intention, while perceived usefulness has no significant effect. The important external variables are subjective norm and computer self-efficacy, both of which act on perceived ease of use to affect behavioral intention (Yuen and Ma 2008). In contrast, a survey of 268 university instructors in Taiwan on their acceptance of web-based learning systems shows that perceived ease of use has a weak influence, whereas subjective norm and perceived usefulness have the strongest total effects on behavioral intention (Wang and Wang 2009). Furthermore, another study concerning 402 Taiwanese junior high school teachers and web-based e-learning systems shows that perceived usefulness and perceived ease of use demonstrate the strongest total effect on behavioral intention (Chen and Tseng 2012).

These results suggest that an attempt to generalize the results from studies conducted in different contexts may not produce sufficient insights to accurately describe the local situation. Although this does not imply that generalization of knowledge from these studies is impossible, an intensive study should be conducted to understand the interplay between the results and the specific background context in which they are generated. As such, the present study attempts to extend our understanding of the reason that certain factors play an important role in a particular context, rather than simply drawing superficial conclusions about research findings.

Comparison of teachers' technology acceptance models

As shown in the previous section, studies of technology acceptance in the literature are diverse in terms of context, research model, and results. It would still be meaningful, however, to compare the results of studies in a similar context as ours. This section considers several studies from Hong Kong and Taiwan, which are believed to have similar cultural contexts as our study.

Hu et al. (2003) is an earlier study concerning technology acceptance by Hong Kong public school teachers. This study investigates the acceptance of using Microsoft PowerPoint in teaching by surveying 134 public school teachers in Hong Kong. Their results show that all the external variables have either direct or indirect effects on behavioral intention in both data collections. These effects become weaker in the second dataset, whereas both perceived usefulness and perceived ease of use have increased in influence by the end of the training program. Taking total effects into consideration, by the end of the training program, perceived usefulness is the most prominent factor of behavioral intention, followed by computer self-efficacy and perceived ease of use.

Another study from Hong Kong (Yuen and Ma 2008) uses TAM to investigate the technology acceptance of 152 in-service primary and secondary school teachers. Attitude was not included as a key construct in their model, nor did they consider facilitating

conditions as an external variable. The results show that perceived usefulness is insignificant in determining behavioral intention of use. Perceived ease of use has a direct and moderate effect on behavioral intention, while subjective norm and self-efficacy influence behavioral intention through perceived ease of use.

The key determinants of behavioral intention in the above studies are perceived usefulness (Hu et al. 2003) and perceived ease of use (Yuen and Ma 2008). Neither of those studies consider facilitating conditions explicitly at the outset. Apart from the compatibility construct in Hu et al. (2003), there is no construct that may reflect the external constraints imposed on teachers' decisions of acceptance. For example, a teacher may consider a technology useful and easy to use, but when practical considerations are included, one may refrain from accepting the technology because of a lack of facilitating conditions.

A study by Chen and Tseng (2012) on junior high schools in Taiwan (a slightly different culture from Hong Kong) and with a large sample of 402 teachers shows that perceived usefulness, followed by perceived ease of use, motivation to use, and internet self-efficacy, influence teachers' behavioral intention of adopting web-based e-learning systems. In addition, motivation to use was considered an external variable in the model. That study concerns the use of e-learning in the teachers' own professional training rather than in their teaching, so the results may not fully reflect what may happen when they use it as a teaching tool.

Wang and Wang (2009) investigate the adoption of web-based learning systems by 268 university instructors in Taiwan. In addition to using self-efficacy and subjective norm as external variables, that study also extends TAM by including three system-oriented factors: information quality, system quality, and service quality. In particular, service quality refers to the effectiveness of support provided to the users. Their results show that both subjective norm and perceived usefulness have a direct effect on behavioral intention, with subjective norm the stronger of the two. Taking total effects into consideration, subjective norm is still the dominating factor, followed by perceived usefulness. The other factors only have weak and indirect effects. These case studies (as well as other research) seem to suggest that researchers often have very different considerations in formulating their models and consequently obtain diverse results. In response, our research targets the primary education sector within a local context. This approach should provide greater insight into teachers' views on educational technology, and will be especially helpful for policy makers when promoting teaching culture with technology (Zhao and Cziko 2001).

Research design and methodology

Modeling with key constructs in TAM

Based on the literature review above, the individual's attitude to the technology is placed as the key determinant of behavioral intention when TAM is the selected research model. Perceived usefulness and perceived ease of use relate to attitude as described in TAM. These give rise to the first five hypotheses in the research model:

- **H1** Attitude has a direct effect on behavioral intention.
- **H2** Perceived usefulness has a direct effect on behavioral intention.
- **H3** Perceived usefulness has a direct effect on attitude.
- **H4** Perceived ease of use has a direct effect on perceived usefulness.
- **H5** Perceived ease of use has a direct effect on attitude.

Furthermore, the reliance of adoption on facilitating conditions is consistent with our observation that teachers in Hong Kong are concerned about the efforts and resources required to integrate technology into their teaching. As a result, they rely on external facilitating conditions so that they can limit the additional work to a manageable level. The following four hypotheses are therefore proposed for facilitating conditions:

- **H6** Facilitating conditions have a direct effect on perceived usefulness.
- **H7** Facilitating conditions have a direct effect on perceived ease of use.
- **H8** Facilitating conditions have a direct effect on attitude.
- **H9** Facilitating conditions have a direct effect on behavioral intention.

In addition, data were collected regarding four external variables: facilitating conditions, self-efficacy, computer anxiety, and subjective norm. To maintain a simple research model, a stepwise linear regression analysis (Hocking 1976) was conducted before the main analysis. In the stepwise regression, the variables were added and removed from the model iteratively to determine the optimal set of variables to be included for a better fit with the data. Behavioral intention was the dependent variable. Attitude, perceived usefulness, perceived ease of use, and the external variables (facilitating conditions, self-efficacy, computer anxiety, and subjective norm) were used as independent variables. The results show that self-efficacy, computer anxiety, and subjective norm had a weak or insignificant impact on behavioral intention. These variables were therefore excluded from our research model in this paper. The resulting research model is shown in Fig. 1.

Linear regression analysis is also used other studies on technology acceptance studies (e.g., Adiguzel et al. 2011; Alenezi et al. 2010; Aypay et al. 2012). Because this analysis assumes that all of the independent variables have a direct impact on the dependent variable (Teo 2009), it is only used in the current study for variable selection in the initial stage.

Sample and sampling

The present study primarily targeted the 21 primary schools subsidized under the "Direct Subsidy Scheme" (DSS) in Hong Kong; however, a number of non-DSS schools were also invited. Invitation packages were mailed to the principals of these schools. Each package

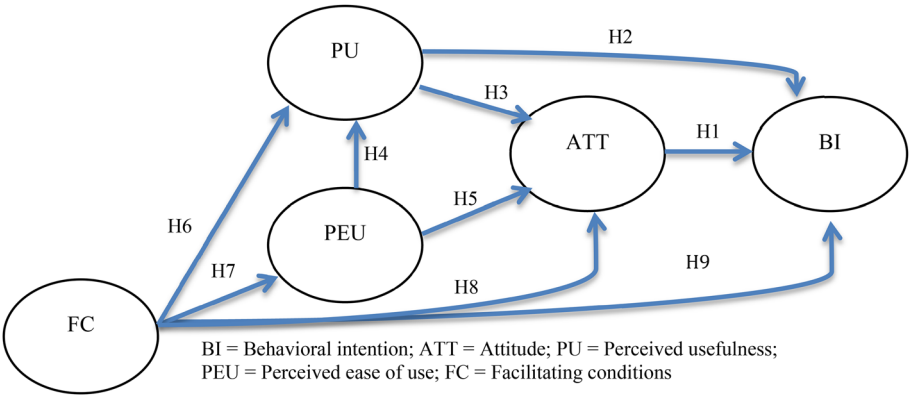

Fig. 1 Research model of the current study

contained an invitation letter and copies of the information sheet for the study, consent forms, and a questionnaire, containing both English and Chinese versions. The principals were invited to pass the documents to their teachers if they were willing to participate in the study; participation by individual teachers was also voluntary. Six schools responded and returned 206 questionnaires in total. Data pre-processing discarded 21 because of missing or invalid answers, leaving 185 valid samples.

Structural Equation Modeling (SEM) is a large sample technique (Lei and Wu 2007). Research methodology texts have different views on the suggested sample size for SEM analysis but a typical recommendation for use with maximum likelihood estimation would be a sample size close to 200, with 100 being considered a minimal requirement (Hair et al. 1995). Our sample size of 185 is in the desirable range.

Instrumentation

Data were collected via a questionnaire survey. To make it clear to the participants that the current study focuses on classroom technology, the questionnaire begins with a statement defining "educational technology" as "any digital computer technology that could assist teaching either in the classroom or in after-class learning activities, which involve students directly in the process". It is also explicitly states that it does not include the use of technology in teaching preparation or administrative tasks.

The questionnaire items for the variables used in the research model are displayed in Table 1. The wording was modified to fit into the current context. The participants gave their answers on a five-point Likert scale (1 is strongly disagree, 5 is strongly agree) to reflect their agreement with each of the statements. All items were given in both English and Chinese, translated by the researchers.

The questionnaires also ask participants about their sex, year of birth, major teaching subject, experience using educational technology in the workplace, and their voluntariness of use. Finally, SEM (Lei and Wu 2007) is used to test the model with the data. Technically, the data are analyzed using R package lavaan with standard maximum likelihood estimation (MLE).

The descriptive statistics showing the behavioral intention scores from the questionnaire answer the first research question (the extent that in-service primary teachers in Hong Kong accept the use of ICTs in their own teaching). The testing of the hypotheses associated with the model in Fig. 1 suggests the major factors affecting this acceptance or non-acceptance, which answers the second research question. The discussion section below interprets the results obtained, and can be used to suggest appropriate steps for school management to increase the acceptance of ICT, answering the last research question.

Data analysis

The data collected from the questionnaires were input into the computer for the aforementioned preliminary linear regression analysis and descriptive statistical analysis. The main analysis was conducted by confirmatory factor analysis (CFA) and SEM (Lei and Wu 2007; Rosseel 2012). SEM is a regression-based statistical modeling approach to analyze the relations of a set of interrelating variables, such as that in TAM, using a system of simultaneous regression equations involving all variables. A model describing the interrelations of the variables is called a structural model. In contrast, the CFA analyzes the relation between the variables and the corresponding questionnaire items under these variables. This relation constitutes the measurement model. In this sense, the SEM is an

Table 1 The questionnaire—constructs and items used in the research model

Constructs	Codes	Items	Adapted from
Perceived usefulness (PU)	PU1	I find educational technology useful in my teaching	Davis (1989)
	PU2	Using educational technology enables me to accomplish teaching tasks more quickly	Davis (1989)
	PU3	Using educational technology increases my productivity (i.e. accomplishes more with less effort and time)	Davis (1989)
	PU4	Using educational technology will increase my chances of getting a promotion	Compeau and Higgins (1995)
Perceived ease of use (PEU)	PEU1	My interaction with educational technology is clear and understandable	Davis (1989)
	PEU2	It is easy for me to become skillful at using educational technology	Davis (1989)
	PEU3	I find educational technology easy to use	Davis (1989)
	PEU4	Learning to use educational technology is easy for me	Davis (1989)
Attitude (ATT)	ATT1	Using educational technology is a good idea	Davis (1989)
	ATT2	Educational technology makes my work more interesting	Thompson et al. (1991)
	ATT3	Educational technology is fun	Thompson et al. (1991)
	ATT4	I like using educational technology in teaching	Davis (1989)
Facilitating conditions (FC)	FC1	I have the resources necessary to use educational technology	Ajzen (1991)
	FC2	I have the knowledge necessary to use educational technology	Ajzen (1991)
	FC3	Educational technology fits well into my workflow	Derived from the compatibility concept in Moore and Benbasat (1991)
	FC4	A specific person or group (e.g. technical support team) is available for assistance with difficulties using educational technology	Thompson et al. (1991)
Behavioral Intention of use (BI)	BI1	I intend to use educational technology in this and the coming semester	Venkatesh et al. (2003)
	BI2	I predict I would use educational technology in this and the coming semester	Venkatesh et al. (2003)
	BI3	I have actual plans to use educational technology in this and the coming semester	Venkatesh et al. (2003)

analysis of both the structural model and measurement model together, whereas the CFA only considers the measurement model. It is common practice for researchers in technology acceptance studies to test the validity of questionnaire items using CFA before conducting the SEM (e.g., Ahmad et al. 2010; Chen and Tseng 2012; Im et al. 2011; Jonas and Norman 2011; Kiraz and Ozdemir 2006; Motaghian et al. 2013; Wei and Zhang 2008).

Results

Demographic and descriptive statistics

The demographic statistics are shown in Table 2. The table shows that the respondents are diverse in terms of age group, subjects taught, experience with educational technology, and

Table 2 Demographic statistics

Items	Frequency	Percentage (%)
Sex		
Female	135	73
Male	45	24
Invalid answers	5	3
Total	185	100
Year of birth		
1960 or before	3	2
1961–1970	71	38
1971–1980	74	40
1981–1990	23	12
After 1990	11	6
Invalid answers	3	2
Total	185	100
Main subject taught		
Business	2	1
General education	3	2
Language	104	56
Science and mathematics	47	25
Arts, PE, and others	15	8
Multiple selected	9	5
Invalid answers	5	3
Total	185	100
Experience with educational technologies		
Never learned about it formally	15	8
Learned, but not used	19	10
Learned, and used for at least one semester	144	78
Invalid answers	7	4
Total	185	100
Voluntariness of use		
Completely free to decide	14	8
Some mandate but otherwise free to decide	61	33
Mandate in most aspects of teaching	108	58
Invalid answers	2	1
Total	185	100

voluntariness of use. Descriptive statistics are shown in Table 3. The raw scores (ranging from 1 to 5) are averaged under each construct for each respondent, and then the descriptive statistics are calculated for all 185 respondents. The resulting mean scores are therefore real numbers from 1 to 5, with a mid-point of 3.00.

The statistics reveal that perceived usefulness, perceived ease of use, and facilitating conditions all have average scores below the mid-point, showing that the in-service teachers in our sample did not consider these three variables to be particularly important in their own experience. Furthermore, attitude and behavioral intention of use only score marginally above the mid-point.

Skewness and kurtosis data are included to check the univariate normality of the data. The maximum likelihood estimation in our analysis requires that skewness be bounded within ± 3 while kurtosis should be bounded within ± 10 (Kline 2005). Our data are in the desirable range.

Behavioral intention by group

It is also interesting to look at the means of behavioral intention of use (BI) by group in Table 4. A one-way ANOVA on age group and subject taught (taking only the groups with valid values and sample size of at least 10) both have F-test p-values far greater than 0.05. Thus, although younger teachers and those teaching science, technology, engineering and mathematics (STEM) subjects are intuitively thought to have higher intention to use technologies in their teaching, our data do not support such an assertion.

Factor analysis

The data are first considered in a CFA without the structural model to check for the validity of the instrument with respect to our data. All items except PU4 have a factor loading of at least 0.50, with 0.389 being the corresponding value for PU4. This item is therefore eliminated from further analysis. The factor loadings are then recalculated in the complete SEM. The resulting factor loadings, average variance extracted (AVE), Cronbach's Alpha, and composite reliability are given in Table 5.

The typical lower bound for desirable values is 0.5 for AVE and 0.70 for the other three (e.g., Nistor et al. 2012). However, some authors suggest that this would depend on the sample size. For example, for a sample size larger than 150, a factor loading as small as 0.45 is considered acceptable (Hair et al. 1995).

Table 6 shows the lower triangular correlation matrix of our raw data with the diagonal elements replaced by the square roots of the AVEs of the corresponding constructs. The

Table 3 Descriptive statistics of the constructs

Construct	Mean	Standard deviation	Skewness	Kurtosis
Perceived usefulness (PU)	2.96	0.57	−0.32	0.17
Perceived ease of use (PEU)	2.64	0.62	0.03	−0.09
Attitude (ATT)	3.12	0.50	−0.07	0.49
Facilitating conditions (FC)	2.72	0.52	−0.22	0.38
Behavioral intention of use (BI)	3.23	0.66	−0.13	−0.38

Table 4 Comparing behavioral intention of use by group

Items	Frequency	Mean of BI	Standard deviation of BI	*F* test p value
Year of birth				0.166
1960 or before	3	3.00	0.58	
1961–1970	71	3.34	0.64	
1971–1980	74	3.22	0.69	
1981–1990	23	3.01	0.67	
After 1990	11	3.09	0.37	
Invalid answers	3	N/A	N/A	
Total	185			
Main subject taught				0.103
Business	2	3.67	0.47	
General education	3	3.33	0.88	
Language	104	3.20	0.62	
Science and mathematics	47	3.22	0.69	
Arts, PE, and others	15	3.58	0.68	
Multiple selected	9	3.07	0.89	
Invalid answers	5	N/A	N/A	
Total	185			

Table 5 Factor analysis and convergent validity

Constructs	Item	Factor loading	AVE	Cronbach's alpha	Composite reliability
Perceived usefulness (PU)	PU1	0.641	0.536	0.764	0.783
	PU2	0.797			
	PU3	0.750			
Perceived ease of use (PEU)	PEU1	0.770	0.675	0.890	0.892
	PEU2	0.819			
	PEU3	0.849			
	PEU4	0.846			
Attitude (ATT)	ATT1	0.647	0.455	0.767	0.768
	ATT2	0.630			
	ATT3	0.705			
	ATT4	0.712			
Facilitating conditions (FC)	FC1	0.577	0.412	0.735	0.732
	FC2	0.746			
	FC3	0.657			
	FC4	0.573			
Behavioral intension (BI)	BI1	0.825	0.729	0.883	0.885
	BI2	0.927			
	BI3	0.804			

Table 6 Checking for discriminant validity

	PU	PEU	ATT	FC	BI
PU	**0.73**				
PEU	0.41	**0.82**			
ATT	0.54	0.51	**0.68**		
FC	0.43	0.56	0.44	**0.64**	
BI	0.40	0.43	0.54	0.50	**0.85**

diagonal elements are larger than the off-diagonal elements in their respective row and column, meaning that the constructs have a higher correlation with their own items than the items in the other constructs. Thus, discriminant validity is verified.

Fitness of model

The goodness-of-fit indices for our model are shown in Table 7 alongside the desirable ranges of values suggested in the literature. Literature on research methodology suggests that each of these indices has its own limitations and it is a common practice to report multiple indices for the readers' reference (Lei and Wu 2007). Our results show that all the indices are within the desirable range recommended by at least one of the criteria suggested.

Results of hypothesis testing

The results of the hypothesis testing are shown in Table 8. Six of the nine hypotheses tested are statistically supported at the p value threshold of 0.05. The non-standardized coefficients, standardized coefficients, and p values are shown in the table.

Table 7 Goodness-of-fit measurements

Fit indices	Criteria	Value
Absolute fit indices		
χ^2 (Chi squared)	–	230.256
d.f. (degree of freedom)	–	126
χ^2/d.f.	<2 (Tabachnick and Fidell 2012) <3 (Kline 2005)	1.827
SRMR (standardized root mean square residual)	<0.08 (Hu and Bentler 1999)	0.061
Parsimony indices		
RMSEA (root mean square error of approximation)	<0.06 (Hu and Bentler 1999) <0.07 (Steiger 2007)	0.067
Incremental fit indices		
CFI (Comparative fit index)	>0.95 (Hu and Bentler 1999) >0.90 (Klem 2000)	0.935
TLI (Tucker-Lewis index)	>0.95 (Hu and Bentler 1999) >0.90 (Klem 2000)	0.921

Table 8 Results of hypothesis testing (*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$)

Hypothesis	Path	Non-standardized coefficients	Standardized coefficients	p value	Results (supported if $p < 0.05$)
H1	ATT → BI	0.672**	0.448**	0.001	Supported
H2	PU → BI	−0.086	−0.055	0.636	Not supported
H3	PU → ATT	0.479***	0.460***	0.000	Supported
H4	PEU → PU	0.093	0.134	0.306	Not supported
H5	PEU → ATT	0.243**	0.338**	0.004	Supported
H6	FC → PU	0.422**	0.478**	0.002	Supported
H7	FC → PEU	0.895***	0.701***	0.000	Supported
H8	FC → ATT	0.090	0.098	0.472	Not supported
H9	FC → BI	0.520**	0.378**	0.001	Supported

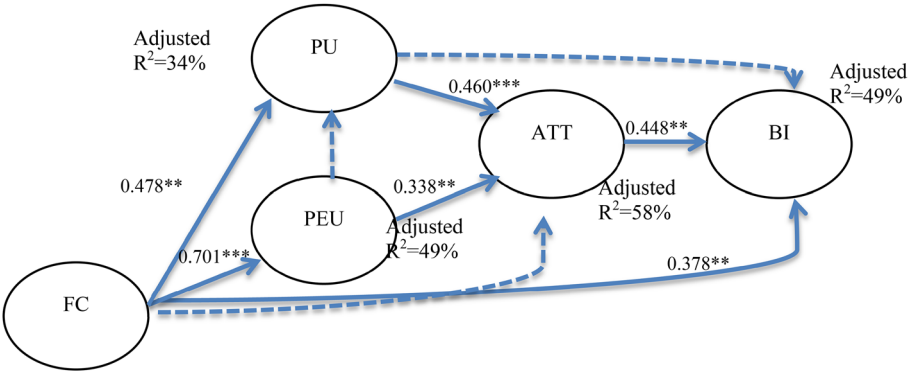

Fig. 2 Standardized path coefficients and adjusted R-squared values

Figure 2 is a graphical representation of the results, showing the standardized coefficients and adjusted R-squared values for the constructs. The statistically unsupported links are shown by dotted lines without the path coefficients.

Finally, the standardized direct, indirect, and total effects among the constructs are shown in Table 9. Of the ten total effects considered, eight are statistically supported. In particular, facilitating conditions (FC) is shown to have the strongest total effect (0.614) on behavioral intention of use, much stronger than that of perceived ease of use (0.172) and the unsupported link with perceived usefulness (0.151).

Discussion

Cultural implication of primary schooling and administration in Hong Kong

Our findings differ from the existing TAM research, this could be the result of unique Hong Kong schooling cultures in primary education, in which the cultural context is an important

Table 9 Direct, indirect, and total effects

Out-come	Deter-minant	Data (n = 185)				p value of total effect	Supported? ($p < 0.05$?)
		Adj-R^2	Direct	Indirect	Total		
BI	PU	0.49	−0.055	0.206	0.151	0.125	Not supported
	PEU		–	0.172	0.172	0.015	Supported
	ATT		0.448	–	0.448	0.001	Supported
	FC		0.378	0.237	0.614	0.000	Supported
ATT	PU	0.58	0.460	–	0.460	0.000	Supported
	PEU		0.338	0.062	0.400	0.002	Supported
	FC		0.098	0.501	0.599	0.000	Supported
PU	PEU	0.34	0.134	–	0.134	0.306	Not supported
	FC		0.478	0.094	0.572	0.000	Supported
PEU	FC	0.49	0.701	–	0.701	0.000	Supported

factor to be considered and unneglectable in educational technology acceptance and pedagogical adoption (Fox and Henri 2005; Nguyen et al. 2006). As a part of the Chinese community, Hong Kong generally shares the East Asian culture of schooling which highlights the hard work of students with their perseverance and awards for academic excellence (Lee 2000). Teachers in Hong Kong generally play a strong role as an authoritative figure, and they take pride in being a knowledge master among their students. Based on Lee's description (2000), students' obedience and their respect of teachers is constantly emphasized in instructional delivery and dialogue; therefore, this maintains the didactic approach without much time devoted to in-class collaborations or individual activities.

The characteristics of Hong Kong primary schools can be further divided into structural terms and cultural terms (Cheng and Walker 2008). In terms of structural aspects, Hong Kong adopts a whole-day schooling policy, where the workload of teachers is generally very high, i.e. 30 lessons a week of 40 min' duration are taught in general. In each class, there are about 35–40 students regardless the level (although some schools may have adopted small class teaching and co-teaching policy with 20 students per class). In addition, teachers are generally assigned with and expected to be actively engaged in other non-teaching and administrative duties, such as offering extracurricular activities, providing student guidance, directing community connection activities, coordinating with parents, and filling up with committee meeting schedules (Lee 2000; Cheng and Walker 2008). Cheng and Walker (2008) commented that it is not uncommon for teachers to work extra hours during weekends in school including Sunday as directed by principals.

Under these circumstances, Hong Kong primary teachers have defined a common working culture on a daily basis. As discussed by Cheng and Chan (2000), teachers' cultural resistance to change has been identified based on the reality of Hong Kong's educational context. It is not unusual to find that seats and tables in staff rooms are arranged in rows similar to factory-like assembly lines, and teachers are always busy in marking and grading assignments. When changes are demanded, it is easy to cause stress among teachers and avoidance to changes as a result (Kyriacou 2001). Under this

educational system, research has shown that around 50 % of primary teachers indicated that their teaching and administrative work was 'out of control' and they suffered from overwork-related pressure (Cheng and Walker 2008). Thus, isolation, preference to not change, and busy work schedules have been found in existing research with similar findings (Wolcott 1977; Fullan and Hargreaves 1992; Cheng and Chan 2000). These factors may influence the attitude of teachers toward new changes with technology.

In terms of cultural aspects, Hong Kong is famous for its examination-oriented education system, where the selected internal school-based assessments of upper level primary students (grades 5 and 6) are submitted to the EDB for the purpose of Secondary School Places Allocation (SSPA). This causes the teachers to stressfully focus on drilling and preparing students for admittance to better school bands (Lee 2000). Besides, high power distance between the leadership and the teachers is characterized among the primary schools, which is consistent with Hofstede's classification of Hong Kong (Dimmock and Walker 1998). Teachers are not expected to participate in the broad consultation and decision making process. This certainly minimizes and suppresses initiative and creativity in the commitment for change (Cheng and Walker 2008). In other words, teachers may be interested in pursuing certain directions even with technology, but the principals at schools make final decisions without the consultation of teachers.

Dominating factor: facilitating conditions

This study attempts to examine the major factors affecting in-service primary school teachers' acceptance of educational technology in Hong Kong. According to our findings, facilitating conditions have a moderate to strong total effect, which is greater than any other variable in the model. In particular, their total effect on behavioral intentions is 0.614, the strongest among all factors. Resources, such as time allowance, computing facilities, internal and external experts (or technical support), and school funding are the key elements to realize the beneficial use of educational technology in teaching (Hew and Brush 2007). It is not surprising to observe that in-service teachers are more concerned about available facilities rather than the usefulness and ease of use of educational technology. Based on previous studies, Inan and Lowther (2010) state that teachers feel more accepting of educational technology in schools that readily provide administrative support, peer collaboration, and technical support. Although our data may not substantiate this particular result, it could be confirmed through a further investigation in the future for more insights. In addition, our study shows that facilitating conditions has a direct influence on perceived ease of use with a total direct effect of 0.701, consistent with the results in Cheung and Vogel (2013) and Ngai et al. (2007).

However, our descriptive statistics on individual items FC1 to FC4 show that teachers gave low ratings for all four facilitating conditions, averaging at 2.62, 2.66, 2.79, 2.81 respectively, all below the scale's mid-point. Hew and Brush (2007) pointed out that a lack of time is one resource-type barrier to technology acceptance. As previously mentioned about Hong Kong schooling cultures, teachers are generally extremely busy and fully occupied with administrative duties (Fox and Henri 2005). Our result shows that this situation is still observable in the local context. One possible explanation is the increased emphasis on managerialism, performance management, and accountability as a result of new public management ideals being realized in the public school sector (Tolofari 2005). To manage the heavy workload and performance requirements, teachers generally believe that the most efficient method to prepare for and deliver a lesson is to adopt the least risky approach: a didactic approach (explicit explanations) may be too laborious, and presenting

a view of what is true and valued may seem dogmatic at times (Kalantzis and Cope 2012). Unless principals require that every teacher use educational technology to enhance their teaching effectiveness, teachers might consider technology-aided education as supplementary to work performance rather than a requirement.

However, the average for BI1 ("I intend to use") is actually quite high at 3.86, although the overall average for BI is lowered by the other items: BI2 ("I predict I would use", 2.97) and BI3 ("I have actual plan to use", 2.87). This may indicate that teachers consider plans for the future adoption of technology in teaching somewhat uncertain, despite having a clear intention. Perhaps enhancing facilitating conditions such as technical support and teaching/administrative workload could motivate teachers for future technology adoption. Although examining the outcomes of acceptance toward adoption is beyond the scope of this study, it would be of value to further explore such connections in our local context (see Jaffee 1998).

Second strongest factor: attitude

Attitude has a moderate total effect (0.448) on behavioral intention. Attitude can serve as a personal belief, self-motivation, and self-satisfaction when teachers develop their intention to use educational technology (Cheung and Vogel 2013; Lee and Lehto 2013; Tondeur et al. 2008). According to Hew and Brush (2007), teacher attitudes toward technology may be conceptualized as whether teachers like using technology, and it serves as a major barrier to the acceptance and even integration of technology. Our result supports this phenomenon in the local context. It is interesting to note that in-service teachers actually demonstrate the importance of attitude instead of the impact of perceived usefulness toward their behavioral intention, which aligns with some existing works (e.g., Cheung and Vogel 2013; Sang et al. 2011). Thus, personal feelings toward the use of educational technology may provide teachers the motivation to build up an intention, regardless of usefulness in reality. This may indicate that in-service teachers show their own personal pedagogical beliefs and unique teaching styles; somehow this intuition gives them reasons to carry out their own teaching methods with or without technology (Hew and Brush 2007). This result also shows that the personal beliefs and dispositions of teachers can relate to technology acceptance or adoption in the classroom (Inan and Lowther 2010).

Despite in-service teachers considering their own feelings towards educational technology to be important, the results show that the possession of attitude is partially built upon their perceived usefulness and perceived ease of use. This is supported by Sang et al. (2011) and Cheung and Vogel (2013). Such an attitude may also include teachers' prior experience and beliefs about specific and general abilities (Straub 2009). Nevertheless, how to develop the attitude of teachers to promote the usage of educational technology in local primary schools is relatively challenging, as attitudes may not be easily changed (Guskey 1989). Based on these findings, policy makers should take care when introducing educational technology into schools when teachers have strong personalities and teaching beliefs about technology.

Insignificant factors: perceived usefulness and perceived ease of use

In contrast to the dominating effects of facilitating conditions, the impact of perceived usefulness on behavioral intention is shown to be null or close to null. In terms of total effect, it has no statistically supported effect (0.151 with a p value as large as 0.125) on behavioral intention. Similarly, perceived ease of use has a very small impact on

behavioral intention. Its total effect on behavioral intention, although statistically supported, is weak (0.172). This may indicate that teachers pay little attention to perceived usefulness in deriving their acceptance, which may subsequently lead to the adoption of technology. This result appears to be supported by Cheung and Vogel (2013), identifying the role of these two constructs among in-service teachers.

Teachers seem to have some intention to use technology in their teaching if they perceive it to be easy to use. This finding is expected because time is a significant concern among local teachers (Chan 2003). Although ease of use does not imply that actual preparation time can be ignored, working with easier tools certainly lowers the risk of devoting significant time to the whole process. Nevertheless, the results show that ease of use as well as usefulness are not the main nor only deterministic factors behind teachers deciding to use educational technology in teaching (Straub 2009).

Technology acceptance models vary within similar cultural contexts

As shown in the literature review, studies on technology acceptance are diverse in terms of context, research model, and results. Based on these studies, it is clear that even in similar cultural contexts, researchers often take very different considerations in formulating their model and consequently obtain diverse results. For example, Hu et al. (2003) include subjective norm, computer self-efficacy, job relevance, and compatibility of PowerPoint with computer hardware and software as external variables in their model, whereas, unlike our model, attitude and facilitating conditions are not considered. In the study by Yuen and Ma (2008), the results show that, similar to ours, perceived usefulness is insignificant in determining the behavioral intention of use. However, in contrast to our findings, perceived ease of use has a direct and moderate effect on behavioral intention, while subjective norm and self-efficacy influence behavioral intention through perceived ease of use. Our model suggests that when facilitating conditions are considered in the context of Hong Kong teachers, it can dominate the other factors in terms of the total effect on behavioral intention, showing the importance of pragmatic considerations when teachers make the decision of acceptance. However, Chen and Tseng (2012) did not consider facilitating conditions, which makes it difficult to compare with our model.

Based on our results and comparisons, researchers have taken very different considerations in formulating their theoretical models to explain teachers' technology acceptance, even in similar cultural contexts, and consequently different models are created. Our study demonstrates the uniqueness of Hong Kong's in-service teachers and reflects the essential factors in our local context when considering technology in teachers' professional workspace. Although it may not be possible to compare the results of several studies in great depth, the above comparisons do highlight such diversity and clearly illustrate a number of similar elements. Thus, further comparisons can be made by adhering to the particular models adopted in these studies and comparing the resulting coefficients across different sets of data under the same model.

Limitations and directions for further investigations

This study does have a few limitations and possible improvements can be made in further investigations. One direction would be to conduct qualitative interviews to triangulate and verify our interpretation with the quantitative results to provide clues to possible omissions in our research model. Besides, the current study did not specify explicitly the technologies that the teachers should consider while participating in the survey, and the qualitative

interviews can help uncover the underlying acceptances toward particular technologies. As what Teo (2015) suggested in the similar research, specific technology tools (e.g. Moodle, Google Drive, Facebook) may also be included into the measurement items to enhance the precision and the different perceptions among these tools.

Second, the sampling size could be improved to collect more responses. Because only 6 of the possible 21 DSS schools returned questionnaires, there is indeed a possible bias in the sampling, as schools that chose not to return the questionnaire may be less concerned with the survey's theme. This bias, if any, would lead to an overestimation of the behavioral intention, attitude, and determining factors in the model. The current study has not further investigated the effect of this possible bias. Even though future works could be done to extend this research with qualitative approach, our analysis has shown that the result is statistically significant which can set a future direction for addressing the generalizability concern. Schools may have been unable to participate for many reasons, one being that local schools in Hong Kong have extremely busy administrative and teaching schedules as discussed (Fox and Henri 2005). Teachers may not have enough time to complete their basic requirements, and any further task (including this survey) could be considered an extra burden. The response rate may intuitively explain the low mean scores for each construct concerning technology acceptance. Another possible factor is that the principals may not find any incentive to accept the invitation, if accepted, it would increase the workloads of teachers by filling in the questionnaires on their busy schedule. Besides, most of our invited schools were the DSS schools, which are permitted by the EDB to have greater flexibility in various areas including resources deployment, curriculum design and student admission. The DSS school principals may then easily reject the invitation without worrying to cause any potential risk to their school developments or reputation to the EDB. Therefore, further investigations regarding the details behind the teachers' perceptions on educational technology would be of value.

Although our goal in this study was not to develop a new TAM research model, improvement to the model via alternative conceptual frameworks other than TAM can be considered. One candidate could be Maslow's Hierarchy of Needs, which states that human behaviors are motivated by the satisfaction of different levels of needs (Maslow 1943). In the context of technology acceptance, potential users seem to seek to fulfill different levels of needs when deciding on the acceptance or non-acceptance of technology. Maslow's hierarchy may address the more fundamental dimension of motivation rather than a mix of external and internal conditions. Moreover, technology acceptance research within a particular cultural context may be more interesting if it was tied to particular conditions or specific technology tools (e.g., GeoGebra, Schoology, mobile devices) (Teo 2015), pedagogies with technology, learning and assessment models, or multiple dimensions of learning (e.g., social, mobile, cognitive, behavioral, etc.), along with their potential differential outcomes and teacher perceptions, or even sex (Teo 2015). This may be an interesting direction for future technology acceptance research.

Conclusions

In this study, we investigated educational technology acceptance among Hong Kong in-service primary school teachers. Given our unique cultural context and working demands, our teachers consider that facilitating conditions are key to the behavioral intention of using technology to assist their teaching. Attitude also serves as an important factor under

the model, and it has a strong influence on teachers' intention to adopt educational technology in their teaching. Perceived usefulness and perceived ease of use are crucial in terms of the causal effect to the development of attitude toward technology on a daily basis, but have a weak or no effect on behavioral intention.

The unique schooling culture in Hong Kong as discussed, therefore, implies that facilitating conditions and attitude are far more crucial in technology acceptance, which is different than most of the existing TAM research works. When teachers are extremely busy and under high stress with heavy teaching and non-teaching workloads, accepting new pedagogies with technology and even adopting them may be perceived as an additional workload in terms of acquiring them and becoming a mastery of technology usage. With all the constraints in school cultures, as what it is suggested by Fox and Henri (2005), it is not surprising that changes may be possible if facilitating conditions and attitude support the new changes with technology.

Thus, merely persuading teachers that the tools are easy to use or simply useful is not sufficient to promote technological pedagogical cultures in schools in Hong Kong. Schools need to provide better facilitating conditions to in-service teachers before promoting ICT in their schools for teaching and learning. Thus, schools need to recognize the contribution of teachers when integrating technology into teaching. They need to identify how to ensure positive attitudes to the adaptation of technology to create a technological pedagogical culture in schools (Tondeur et al. 2008).

Our study, as well as others, suggests that even under similar cultural contexts, researchers often take very different approaches in formulating models and consequently obtain varied results. Indeed, as suggested by Teo (2015), the promotion of the use of educational technology cannot rely on institutional mandates to ensure teachers' compliance in technology use. To conclude, educational policy makers and administrators, at both government and school levels, should pay greater attention to these key observations when promoting ICT in education in the local context. Although government has attempted to promote ICT to enhance teaching and learning, it is crucial to first recognize the circumstances and perceptions of teachers toward technology. Through mutual understanding, teachers can gain direct benefits from ICT in their teaching profession.

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