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Exploring student voice in teachers' motivation to use ICT in higher education: Qualitative evidence from a developing country

Mingming Zhou* and Timothy Teo

Faculty of Education, University of Macau, Av. Padre Tomas Pereira, Taipa, Macau SAR, China

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ABSTRACT

Success of ICT integration in the classrooms is, to a large part, accounted for by teachers' engagement with technologies. However, while many studies have identified the factors that affect teachers' decision to use technology, few have considered student perception as a likely influence. Increasingly, there is evidence in the literature to support a trend that recognizes student perception more explicitly in examining teachers' motivation in engaging technologies for instructional purposes. This study examined the role of student perception to understand why teachers decide to use technology in their teaching. Participants were 169 university students in Macau who responded to an open-ended question on what they thought were factors that motivated teachers to use technology in the classroom. Data were analyzed using a two-stage coding strategy. Results revealed nine possible themes to explain students' perceptions of the factors that acted as motivators for teachers' decision to use technologies in the classroom. Implications for theory and practice were discussed.

Introduction

There is a widespread belief that Information and Communication Technologies (ICT) plays an important role in revolutionalizing and transforming teaching and learning at different levels of education. Modern technology strongly supports improvements in classroom teaching and learning by widening access to education (Rafique, 2014), and by promoting a higher level of engagement among students (Drent & Meelissen, 2008). However, the potential benefits of ICT are often not realized in education and researchers believe that teachers play a significant role in it (Jimoyiannis & Komis, 2007). The effective integration of ICT in education is a complex and multifaceted process wherein the internal and external influences that drive teachers' use of technology play a significant role in the success or failure of ICT implementation in schools. Many studies have identified the factors that affect teachers' decision to use technology in higher education, yet relatively few of them have considered student views on what motivates teachers to use ICT as important. Where student perceptions have been taken into account, researchers had mainly focused on the former's attitudes, preferences, and experiences with ICT, rather than considering student as active participants in the ICT integration process (Wilkinson, While, & Roberts, 2009).

* *Corresponding author.* E-mail address: mmzhou@umac.mo

In recent years, Maunder and colleagues (2012) argued for a growing need to 'hear' what students say in understanding teachers ICT usage in higher education. In the absence of students' views, understanding the factors around teachers' motivations to integrate technology in teaching would be incomplete and prone to bias. In this study, we aimed to examine students' perceptions on teachers' motivation to use ICT in class in higher education within the Theory of Planned Behavior Model – a framework that models an individual's intention to enact a particular behavior. This study has the potential to generate further insights into students' perceived motives that explain teachers' use of technology in the classrooms and in doing so, contribute to the extant literature through enhancing our understanding of the applicability of TPB in explaining teachers' intention to use ICT for educational purposes.

Missing voice in technology acceptance research – Students

A large body of literature has documented different factors that drive teachers to use technology in the classroom. Invariably, researchers approached this issue from teachers' points of view. However, although teachers are the main agents of ICT use for instruction (Teo et al., 2016), students play a key role in the teaching and learning process. With an increasing focus on student-centre learning and a departure from traditionalist teaching (a uni-directional transfer of information from the teacher to the student) (Barak, 2007), any decision relevant to teaching and learning should consider the student's point of view. In order to succeed in the student-centered learning environment, teachers and students have to work in partnership to integrate technology into classroom and their shared beliefs must be thoroughly understood and considered in the process (Li, 2007). For this reason, researchers argued that the perception of students, a crucial aspect in the integration of technology for teaching and learning, must be considered (Galbraith & Haines, 1998). This is because students exist symbiotically with the teacher in the classroom and they carry "unique" points of view to provide precious sources of information and constructive considerations on teaching. Indirectly, what students perceive as motivators for teachers to use technology in teaching could be significant influences on the latter's intention to use or actual use of technology.

From the literature, many studies focused on students' attitudes, preferences, and experiences of ICT in higher education (e.g., Barczyk & Duncan, 2013; Viberg & Grönlund, 2013; Westerman, Daniel, & Bowman, 2016), rather than investigations of student reasoning about why ICT tools are being by their teachers in classrooms. Given the emerging roles of the teachers and students in an increasingly technology-mediated learning environment, it is reasonable to expect that, by not considering the opinions and concerns of the teacher in using technology, we would miss the bigger picture in our pursuit to enhance our understanding about teachers' motivation to use ICT integration in education. Involving students in our examination of this process thus becomes essential.

Theory of Planned Behavior and Technology Acceptance Model (TAM)

We positioned this study within the Theory of Planned Behavior (TPB) model, which has been widely applied in research. The main purpose of this model was to understand the role of intention on changing people's behavior (Ajzen & Manstead, 2007). The TPB assumes that a key determinant of the execution of a behavior is an individual's intention to carry out that behavior (Ajzen, 2002). It is further determined by three distinct sets of beliefs: (1) beliefs about the probable outcomes of the behavior, which produce favorable or unfavorable *attitudes* toward the behavior; (2) beliefs about the expectations of others and the motivation to comply with those expectations, which result in perceived social pressures (or *subjective norms*) to or not to carry out that behavior; and (3) beliefs about internal (e.g., knowledge, skills, and abilities) and external factors (e.g., beliefs about infrastructure, supportive staff and access to computers), which concern the ease or difficulty that is associated with executing, or power to execute a behavior (or *perceived behavioral control*). Together, these three elements jointly determine intention to engage in a behavior (Ajzen, 2002). The TPB has been corroborated by many empirical studies in explaining the intention of using technology in higher education (Fichten et al., 2016; Liu, 2010; Shroff, Deneen, & Ng, 2011), and efforts have also been made to extend the original model to improve its explanatory power for behavioral intention (e.g., Teo & Zhou, 2014).

As a highly recognized extended model of TPB, the Technology Acceptance Model (TAM; Davis, Bagozzi, & Warshaw, 1989) articulated two determinants of attitude towards technology use: perceived usefulness and perceived ease of use. According to Davis et al. (1989), perceived usefulness refers to the degree to which a person believes that using a technology will enhance his or her job performance, and perceived ease of use refers to the degree to which a person believes that the use of a technology will be free of effort. Past empirical studies have repeatedly evidenced that both perceived usefulness and perceived ease of use influenced attitudes towards technology (Teo & Milutinovic, 2015; Teo, Milutinovic, & Zhou, 2016; Wong, 2015). Within TAM, researchers have been able to expand our understanding of one's intention by further identifying reasons for users' attitudes towards the use of technology in higher education.

A qualitative approach to examining technology acceptance

A common way to study technology acceptance was through quantitative methods by collecting teachers' self-ratings on pre-determined variables through survey questions. A quick review of empirical studies in educational technology from 2006 to 2016 revealed that less than 120 among 12000+ reports in Web of Science were identified as having used non-quantitative methods. Although the choice of these variables was grounded in theory, their pre-selection limited the research scope (McGrail, 2005). Furthermore, Vogelsang and others (2013) pointed out a problem in the building process of acceptance theories by combining already existing theories. This makes it hard for unknown constructs that might be of high relevance to explain

technology acceptance to find entry into the models. In this sense, this theory building process can be characterized as incomplete and limits the scope of our understanding of the issue and the application of the models.

To date, any model in technology acceptance so far could only explain more than half of the variance of "Intention to Use" or "Behavioral Intention". The researchers always made a call for future research for seeking other possible contributors to the model. Earlier, Johnson (1995) urged technology educators to "engage in research that probes for deeper understanding rather than examining surface features (p.4)". Complex organizational and learning settings where technology is heavily used can usually very well be examined with qualitative research methods (Palvia, En Mao, Salam, & Soliman, 2003). As qualitative research would uncover new perspectives about which much is already known (Strauss & Corbin, 1998), research problems framed as open-ended questions would support the discovery of new information, as a way to improve our knowledge (Hoepfl, 1997). For example, research using qualitative methods found that the impact of leadership (Kavanagh & Ashkanasy, 2006), personality (Ouadahi, 2008), trust in teammates and supervisors (Vogelsang et al., 2013) also exerted an influence on technology acceptance. These new constructs that were relevant to accept technology would not have been reveals without the aid of qualitative approaches. Thus, qualitative methods are appropriate in situations when we attempt to identify the variables that may be ignored.

Context and aim of the present study

In this paper, we attempted to unpack the different types of motives university students perceived in their teachers' use of ICT in classroom. In 2015, Macau ranked 24 of 167 countries in the level of access, use and skills of ICT by the International Telecommunication Union (Macau ranked 24th in global index of ICT access, 2015). Along with this development, Macau has become active in promoting technology integration in education across grade levels (Zhou, Chan, & Teo, in press). More and more teachers in Macau universities and higher institutions have become enthusiastic about and competent in trying new technology in their teaching. However, compared to other developed countries, the use of ICT in classroom is generally still limited in Macau (Fan & Ho, 2012). Teachers' desire and act to attempt with new technology are constrained by a variety of factors that come across the personal, social and situational levels. How students (audience of technology use) think and explain about teachers' technology use decisions becomes critical as students' perceptions provide an alternative angle to examine teachers' decision to use technology in classroom.

This study thus aimed to explore university students' perceptions of the drivers that motivated teachers to use ICT for instructional purposes. Two questions were designed to guide this study.

1. According to university students, what motivates teachers to use ICT in higher education?
2. To what extent can students' responses be explained by the TPB and TAM?

Methods

Participants

The participants were 169 university students from various departments at a comprehensive public university in Macau. Among the participants, 58 (34.3%) were males and the mean age of the whole sample was 20.50 years old (SD=2.02). In terms of grade level, 90.9% were undergraduates, while the rest were graduate students. All participants own a computer at home and the mean year of computer usage was 10.47 (SD=3.10). On average, the participants used computer for 3.82 hours per day (SD = 2.44).

Procedure

Undergraduate students at the university completed the questionnaires in hardcopies at the end of their class with the permission of the course instructor. Passive consent was obtained through the participants' willingness to give their responses after being briefed on the purpose and nature of this study, and informed of their rights not to participate in the study and the option for them to withdraw from the study during or after they had completed the questionnaire. Participation in this study was voluntary and no reward of any kind was offered.

Measures

The questionnaire used in this study comprised two parts. Part one contained questions on their demographics including gender, age, years of experience in using computer. Part two comprised an open-ended question: "*In your opinion, what factors do you think motivate teachers to teach with technology? Please list as many as you can think of*." Participants were encouraged to state as many points as they wished.

Analysis strategy

Participants' responses to the open-ended question were keyword-coded and categorized. These analyses involved sorting through the open-ended responses and identifying themes that characterized the drivers which students perceived of their teachers' use of ICT in teaching. Coding proceeded in two steps (Smyth, Dillman, Christian, & Mcbride, 2009). First, the first author coded 10 percent of the responses to develop a list of codes that clearly indicated what was to be coded as themes. Second, the first author and a research assistant used the established codes to analyze the remaining responses independently. While some coding categories were drawn from the TPB, others were developed inductively during the analysis. By this practice, we sorted the responses into themes that facilitate the development of TPB (Strauss & Corbin, 1998). After content analysis, the cumulative frequency and percentage for each identified theme were calculated. This allowed the researchers to gain a better understanding about the distribution of perceptions across themes.

To ensure the reliability of the coding process, the results were compared and contrasted by the first author and research assistant. They were in agreement about themes on 87.1% of the responses, and the discrepancy in the coding was discussed and resolved between them (Creswell, 1994). To ensure the validity of our analyses, we gathered feedback from the other author to conduct the member checking with a view to safeguard the logic of the interpretation (Guba & Lincoln, 1989).

Results

Overall, the 169 respondents produced 260 valid answers (perceived motives) to the open-ended question, with a mean of 1.54 motives per student. In total, nine themes were identified, with different levels specified for two themes (attitudes and subjective norms). Some corresponded to TPB and TAM, while others were not. Table 1 shows a summary of the cumulative frequency and percentage for each identified theme. Almost 40% of the student responses indicated the cognitive benefits of technology use, such as '*improving teaching quality*', '*making lesson delivery more efficient*', '*explaining abstract concepts more clearly*', and '*promoting interaction among students*'. This was coded as the instrumental dimension of attitude, which taps on the cognitive benefits of using technology. It is also noteworthy that 16% of the responses were related to the use of technology to make the lesson interesting and attract student attention. This was coded as the affective dimension of attitude, which taps on the emotional responses generated by technology use. The convenience and easy operation of technology was perceived to be another important motives for teachers' use of ICT, reflected in about 20% of the responses.

Table 1. Cumulative frequencies and percentages of themes for motives for ICT use in higher education (out of 260 responses).

Code	Theme	Origins of Theme	Example Answers	Frequency
1.1	Instrumental Attitude	TAM (Perceived Usefulness)	Teachers can play some inspiring videos and make students express themselves; Teachers can clarify the thoughts and emphasize the key points.	98
1.2	Affective Attitude	New	Teachers use technology in order to make the lesson more interesting.	41
2.1	Student Expectation	TPB (Subjective Norms)	To satisfy different students' requirements.	18
2.2	Department/ University policy	TPB (Subjective Norms)	Faculty's requirement; Promotion of technology in university	6
2.3	Social Trend	New	Follow the trend of technology development	12
3	Perceived Behavioral Control	TPB	… because of the amount of knowledge teachers have.	8
4	Perceived Ease of Use	TAM	Simple and easy to use.	49
5	Facilitating Conditions	New	No limitation of time and space.	7
6	Teaching Load Reduction	New	If students can better understand the videos, pictures and PPT, the teacher does not need to teach too much.	11
7	Benefit of Technology	New	Creative, novel. Can follow latest information, such as population, economy and policy.	6
8	Environment Protection	New	Paper-saving.	2
9	Data Management	New	Easy to deal with a lot of data.	1

Note: TPB = Theory of Planned Behavior (Ajzen, 2002); TAM = Technology Acceptance Model (Davis, 1989)

In terms of the contextual influence of teachers' decision to adopt technology, students identified four types of sources of influence: student needs and expectations of technology use (7%), university/department requirements (2%), and social trend of using technology (5%). Other identified motives emerged from student answers included perceived behavioral control (3.08%), facilitating conditions (2.69%), and a reduction of teaching load (4.32%). A few students also noted the novelty of using technology to update information (2.31%), paper-saving (less than 1%) and easy learning data management (less than 1%) as possible drivers. The results were aligned to the TPB and an extended technology model is presented in Figure 1.

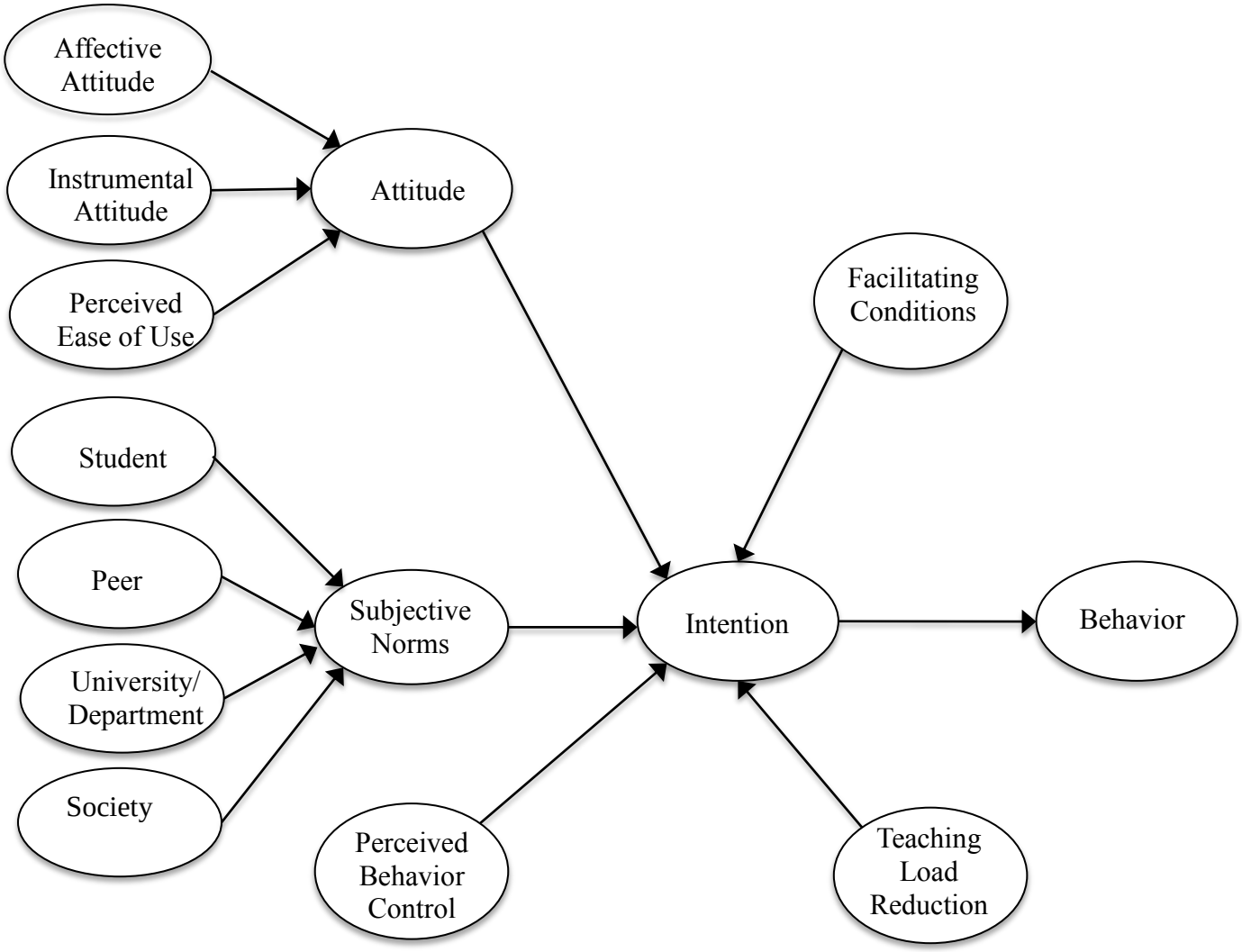

Figure 1. Extended Model of Technology Intention Behavior

Discussion

Our study generated several important findings that have implications for theory and practice. First, we verified the three core constructs in TPB, one core construct in TAM and one other construct in extended form of TAM. For example, majority of the responses (70.77%) of the responses had fallen into attitudes, the most frequently mentioned motives for teachers' use of ICT, followed by subjective norms, and perceived behavioral control. This pattern aligned with past TPB and TAM model testing results (e.g., Lee, 2010).

Second, within each of the core constructs, we observed that students had made strong distinctions between different types of attitude and different sources of subjective norms. Researchers have differentiated attitude as an affective and instrumental components. The former refers to emotions and drives engendered by the prospect of performing a behavior, whereas the latter refers to a more cognitive consideration of the extent to which performing a behavior would be advantageous (Manstead & Parker, 1995). As French et al. (2005) posited, this distinction is crucial because current studies in technology acceptance may fail to identify a number of beliefs with potentially unfortunate consequences for prediction and intervention, if only one type of attitude was considered. Our data supported the instrumental–affective distinction. Forty-one (29.50%) out of 139 responses attributed to attitude tapped on the affective dimension of attitude, in comparison to 98 (70.50%) responses that were concerned with the instrumental dimension. We speculated that this response pattern was partly due to the maturity and technology experience of the respondents, compared to younger learners who

tended to view their experience with technology in school as a fun activity such as playing games and chatting with friends (McKenney & Voogt, 2010) hence they had perceived technology more affectively.

Similarly, Hossain and de Silva (2009) have argued that normative beliefs can also be multidimensional. Indeed, participants in this study specified different types of norms that affected teachers' decision, including students, university/ department as well as society. Unfortunately, there has been a serious lack of consideration of the dimensionality of attitude and subjective norms in current intention studies in technology use, despite a few studies in other behavior (e.g., De Pelsmacker & Janssens, 2007). We hoped that the findings in this study would lay a foundation for future research to examine the multidimensionality of attitude and subjective norm in the modeling of user intention behaviours.

Further, additional constructs that explained teachers' ICT use in classrooms were identified from our data. Some of them are similar to several extended forms of TPB, such as perceived ease of use (Ratna & Mehra, 2015) and facilitating conditions (Ngai, Poon, & Chan, 2007). Others emerged as an independent category of motives including teaching load reduction, novelty of technology, environment protection and data management. Despite the small number of responses in these categories, they reflected students' perceptions about teachers' use of technology.

Last, our study proved again the value of adopting alternative methods over quantitative approached in researching about techology acceptance. With the help of the qualitative research techniques, we were able to identify acceptance factors that could not be derived from exsiting theories and models. We concur with Vogelsang et al. (2013) that there is no need to reduce the complext context in order to create a quantitative scale. The process of technology implementation is dynamic and complex, which can hardly be measured with a group of survey items. In-depth descriptions of user experiences with the technology would not only enrich our understanding of the situation but also improve theory building by uncovering previously unknown variables. In this way, the theory construction in technology acceptance would advance greatly.

Several limitations are found in this study. The use of content analysis, with its reductinist protocols, is limited in its inability to derive richer thoughts and comments from the responses. Related to this is a lack of triangulation of our data. Data in other formats (e.g., numerical) could be collected to provide more enriched asnwers to our research questions and corrobate each other. Another limitation is the general nature of the open-ended question in our study. Because we did not specify the type of technology in the question, it was possible that participants had responded with a given type of technology in their minds such as Moodle or Facebook, thus introducing errors into the data. In future studies, by re-framing the questions with a specific technology, we believed that we would be able to collect more meaningful and thoughtful responses.

Implication and conclusion

Student perception is scarcely heard in research on technology implementation in education. Yet, in order for effective learning to take place, it is essential to have efficient communication between the two main stakeholders: teacher and student. Past research suggest that students' views were less given less attention than the teacher's in the use of technology for teaching purposes (Li, 2007). However, in anticipation of the changing landscape in learning environments and learner type (Teo, 2013), the need to synthesize students' and teachers' views has become greater. The results of this study may provide an initial impetus in this direction in connection with teachers' ICT use for instructional purposes. In addition, our findings could inform school leaders in their attempts to promote the sustained and innovative use of ICT for curriculum design, assessment, and lesson delivery, by taking into consideration the perspectives of the audience of technology (i.e., students).

In this study, we argued that it is possible and necessary to understand teachers' motives to use technology in higher education through the lenses of the students. Our study also supports the applicability of qualitative research methods as an effective way to study students' perceptions of the motives that drive teachers to use ICT in the classroom. This approach offers a content rich method which enables us to identify and to discuss impact factors on technology acceptance. Half of the factors in this study that impacted on teachers' intention to use ICT were new. This would not have emerged with traditional quantitative survey methods. Understanding these factors that affect ICT use in education could provide educators and policy makers with new insights, with an aim to work towards enhancing the effectiveness of the teaching and learning process. Specific suggestions can thus be made to respond to student perception in technology integration in their classrooms.

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