Exploring the Usage of ICT and YouTube for Teaching: A Study of Pre-service Teachers in Hong Kong

Elson Szeto · Annie Yan-Ni Cheng

Abstract Pre-service teachers are expected to teach the digital-native generation of students in the information and communication technology (ICT)-enriched school environments. The aim of this study is to better understand their usage of ICT tools and YouTube for teaching during their teaching practicums. Multiple data sources, including interviews, observation of class sessions, a questionnaire and relevant materials, were collected in a teacher education institution in Hong Kong. The results reveal that their ICT usage is high and YouTube is useful for teaching at all three school levels: kindergarten, primary and secondary. The constraints and affordances of YouTube for teaching were identified, namely 'information', 'demonstration' and 'open-ended constructivist'. However, the pre-service teachers have not fully utilized this ICT tools as part of the constructivist approach. Implications for educators are discussed.

Keywords YouTube · Preservice teacher · Affordance · ICT teaching · Constructivist · Higher education

Introduction

New technologies are increasingly important in our daily lives. Information and communication technology (ICT), in particular, has spawned Facebook, Twitter, Wikipedia and YouTube. Internet functions that are used ubiquitously among the current generation of students. As a global trend (OECD 2001), using ICT tools is found to enable student learning, affecting traditional pedagogy (Szeto 2011) and teacher education (Brown and Warschauer, 2006). In this regard, school teachers are encouraged to engage in professional development to foster a community-wide culture conducive to integrating ICT in teaching and learning (Education Bureau 2008; International Society for Technology in Education 2008). It is expected that the teachers will play an important role in searching for, creating, and synthesizing learning materials with new affordances of ICT tools (OECD 2001).

Statistics show that the majority of school teachers agree that ICT can make teaching effective in Hong Kong (Education Bureau 2008), with 62 % of primary school teachers and 52 % of secondary school teachers confident in their ability to select appropriate digital resources for teaching. However, little is known about preservice teachers' perceptions and experiences of teaching with ICT tools and the way in which they shape student learning. Pre-service teachers' perceptions of technology influence their intention to use it (Teo and van Schaik 2009), and as they are learning to teach digital-native students at various school levels, understanding their usage of ICT tools in teaching is essential for enhancing student learning.

Among the ubiquitous ICT tools, YouTube is the most frequently-accessed Internet-based video website worldwide that pre-service teachers have grown up with (Ashraf 2009; Duffy 2008). Researching their perceptions and experiences of YouTube affordances for teaching may also enrich our understanding of their specific usage of this tool. Therefore, this study seeks to address the following questions:

(1) How often do preservice teachers use ICT tools and, in particular, YouTube in their teaching practicums?

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(2) What are the perceived affordances and constraints of YouTube in teaching?
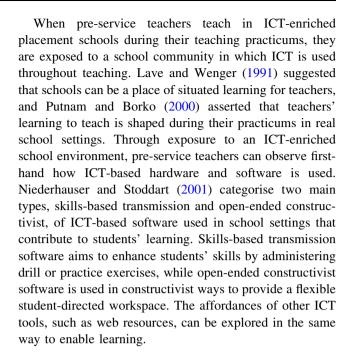
(3) What is the scope for using YouTube for teaching and learning in the classroom?

Enhancing Learning and Teaching Using ICT Tools

Using ICT tools in the classroom contributes to the creation of a powerful learning environment (Smeets 2005; Webb 2005; Shieh et al. 2010) in which teachers are more likely to implement constructivist teaching approaches (Judson 2006; Chen 2011). This aids students' acquisition of subject knowledge by saving time when searching for relevant information (Cheng 2009), and encourages collaborative learning for the synthesis of new knowledge, which may lead to desirable learning outcomes. Teo, Chai, Hung and Lee (2008) suggested that the teacher-centred approach involves teaching to transmit knowledge, where teachers are the main source of knowledge, whereas the learner-centred approach involves teaching to achieve knowledge construction, where learners make sense of knowledge in a communal context. Three dimensions, (1) information resource; (2) information tools for searching for and processing information and for emphasizing interactions between students and the subject-domain content; and (3) learning tools for demonstration and practice in specific subject matter, have been identified in the examination of teachers' perceptions of the use of ICT tools (Duffy 2008; Niederhauser and Stoddart 2001; Tondeur et al. 2007). Using ICT tools to enable teaching and learning is not new. Yet, the important issues of how to equip pre-service teachers to teach in ICT-enriched school environments remains as teachers play a key role in deploying the powerful tool of ICT, and in exploring the affordances of ICT tools for classroom teaching.

Affordances of ICT and Situated Learning in School Environments

The use of the term "affordance" has constantly evolved, and the concept has been employed in research in both the Human Computer Interaction (HCI) field (Gaver 1991; Norman 1988, 1999) and the education field (Downes 2002; Kennewell 2001; Laurillard et al. 2000; Webb 2005) to describe the opportunities that teachers perceive to be afforded by ICT-based learning environments. Studies highlight that the effect of ICT affordances on teaching and learning in different education fields (e.g. Webb 2005; Zhang et al. 2011) and the analysis of student learning in ICT-enriched learning environments (Barnes 2000; Brown, Stillman and Herbert 2004; Hammond 2010) are both avenues of research worth pursuing.

When pre-service teachers teach in ICT-enriched placement schools during their teaching practicums, they are exposed to a school community in which ICT is used throughout teaching. Lave and Wenger (1991) suggested that schools can be a place of situated learning for teachers, and Putnam and Borko (2000) asserted that teachers' learning to teach is shaped during their practicums in real school settings. Through exposure to an ICT-enriched school environment, pre-service teachers can observe first-hand how ICT-based hardware and software is used. Niederhauser and Stoddart (2001) categorise two main types, skills-based transmission and open-ended constructivist, of ICT-based software used in school settings that contribute to students' learning. Skills-based transmission software aims to enhance students' skills by administering drill or practice exercises, while open-ended constructivist software is used in constructivist ways to provide a flexible student-directed workspace. The affordances of other ICT tools, such as web resources, can be explored in the same way to enable learning.

Affordances of YouTube Videos in Teaching

Video is widely used for teaching and learning, and can have different influences on student learning. Video can be beneficial to student learning if it is used effectively (Borko et al. 2008; Sherin and Han 2004; Zhang et al. 2011). As the largest video-sharing website on the Internet, YouTube is frequently used for various purposes. It was launched in 2005. Its user age ranges from 18 to 54, and the site attracted more than 1 trillion views from around the world in 2011 (YouTube 2013). YouTube users can contribute, upload, and share videos on the platform. Its video penetration and usage has truly reached every corner of everyday life.

In education, YouTube can be used to illustrate subject content, engage students in the search for information for projects, and inspire innovative teaching methods (Agazio and Buckley 2009). More importantly, most YouTube videos are embeddable in other web-based media or online course environments such as Blackboard or Moodle, where their impacts on teaching and learning are profound. Duffy (2008) suggests that YouTube is in demand to support collaborative and creative learning and for critical assessment and the personalisation of information.

As a multi-purpose repository on the Internet, students can use YouTube to share with others videos that they have produced, discuss issues regarding shared videos, and create learning communities based on video resources (Agazio and Buckley 2009). These functions stimulate a constructivist collaborative learning approach and bring new relevance and applications to subject curricula in various contexts (Duffy 2008). Clifton and Mann (2011)

asserted that YouTube can be used in several ways for teaching as a learning source for searching for learning information, and a tool to facilitate deep learning that supports comparing and analysing ideas, qualifying hypotheses and theorising knowledge, where the teacher's role is to stimulate discussion among students. In sum, YouTube is perceived as processing three types of affordance:

(1) *Information affordance* relates to searching for information and communication to enhance one's own subject knowledge.
(2) *Demonstration affordance* relates to selecting, demonstrating and retrieving information with the use of computers.
(3) *Open-ended constructivist affordance* relates to interaction between pupils, information and subject content in constructivist ways that provide a flexible student-directed workspace such as discussion initiated by students.

Studies investigating teaching with YouTube have often focused on nursing education in Western countries (Agazio and Buckley 2009; Clifton and Mann 2011), with few empirical studies conducted in the context of teacher education or in Asia. It is thus important to understand how YouTube is perceived and used by pre-service teachers to teach the new generation of students inside and outside the classroom in an Asian context. As pre-service teachers will teach the digital-native generation, there is not only a need to examine pre-service teachers' usage of ICT tools but also their perceptions and experiences of using YouTube during teaching practicums, and its scope of use. This paper attempts to fill this gap by conducting a study in Hong Kong.

Method

To examine the pre-service teachers' perceptions and experience of using ICT tools and YouTube in teaching, mixed methods were adopted to seek understanding of the complexity of issues from the participants' perspectives. Multiple data sources were used, including interviews about the participants' situated pedagogic practices, observation of class sessions, a questionnaire, and relevant materials such as lesson plans. Semi-structured interviews, lasting for approximately one hour, were conducted with the pre-service teachers in their fourth year, after they had completed two blocks of teaching practicum, lasting 6 weeks in Year 3 and 8 weeks in Year 4. The participants were asked to talk about their teaching and learning experiences of using ICT in general and then of YouTube for teaching specifically. All interviews were digitally recorded with field notes and transcribed verbatim. Then, the transcripts were cross-checked by the interviewees. A simple questionnaire was administered to examine how often the pre-service teachers used ICT tools and YouTube during their teaching practicums. Lesson observations were also conducted to observe the participants' authentic practice in placement schools. Field notes were taken to record the sequence of activities. Comments were added after the observations by the researchers. In addition, the participants were asked to provide lesson plans of their teaching practicums for further analysis.

A total of 33 pre-service teachers (11 male and 22 female) from an education institution in Hong Kong voluntarily participated in this study after accepting an invitation. All of the participants were Chinese and their ages ranged from 21 to 26. Of these 33, 15 taught in secondary schools, 12 taught in primary schools, and 6 taught in kindergartens during their teaching practicums.

The data analysis consisted of several iterative cycles. First, the framework derived from the literature review (Smeets 2005; Niederhauser and Stoddart 2001; Tondeur et al. 2007) was adopted to analyze the data with grounded theory (Strauss and Corbin 1990). A large number of coded incidents related to the affordances and constraints of YouTube in teaching were identified and subsequently developed into a set of categories by the two researchers. Second, the transcriptions and field notes were coded according to a tentatively predefined set of codes by the two researchers independently. Each initial code was further categorised by sub-themes when necessary. Then, sub-themes of individual themes were further reviewed and refined. Constant comparison (Glaser 1992) was adopted throughout the coding process using NVivo. The coding of the two researchers was compared within NVivo and the inter-rater reliability, the Cohen's Kappa coefficient (Cohen 1960), was calculated as 0.88, indicating that they reached substantial agreement. Any disagreements were resolved through discussion. Illustrations of coded categories and quotes are shown in Table 1.

Results

The results of the analysis are split into three parts: usage of ICT in teaching, perceived affordances and constraints of YouTube in teaching, and scope for using YouTube.

Usage of ICT in Teaching

All 33 pre-service teachers indicated that they had used ICT tools in their teaching practicums. This result shows that ICT usage is high for teaching at all three levels of school, kindergarten, primary and secondary, and that using ICT in

Table 1 Illustrations of coded categories and quotes

Category	Sample quotes
Affordances	
Information affordance	
Supporting teachers to search for up-to-date information	YouTube provides a lot of updated examples to illustrate the themes of the lessons
Demonstration affordance	
Demonstrating the acquired skills and/or their application.	… if they watch video, the students can watch the movement from the top view, bottom view, or any other direction, which helps them to learn better
Open-ended constructivist affordance	
Stimulating students to learn actively	I surf the Internet with the children for 5–10 min twice or three times per week. Sometimes, I may find some information to study with them. This helps to create a learning environment for me to study with my students
Constraints	
Reliability issues	I cannot use YouTube for teaching because the school restricts some websites that are not safe to view, and YouTube is regarded as one of those

teaching has become inevitable. In all, 32 of the 33 student-teachers also reported that they used YouTube during their teaching practicums. Table 2 summarizes the ICT usage of the participants' in-classroom teaching.

In all, 13 of the pre-service teachers reported that they either 'always' or 'often' used YouTube in the classroom. Of these, one teacher taught at the early childhood level, three at the primary level, and nine at the secondary level. Using YouTube to teach was thus observed to be common practice among pre-service teachers.

Perceived Affordances and Constraints of Using YouTube in Teaching

Three main types of affordance were identified in the analysis: 'information', 'demonstration', and 'open-ended constructivism'. Table 3 summarizes the affordances and constraints of using YouTube in teaching. The results show that YouTube was commonly and frequently used for teaching in kindergarten, primary and secondary schools, and has a range of affordances. The pre-service teachers used it as a form of pedagogy to enhance students' subject knowledge both inside and outside the classroom. A detailed analysis of the pre-service teachers' perceived affordances and constraints is presented in the following sections.

Table 2 Summary of ICT usage in teaching practicums

	Never	Sometimes	Often	Always	Total
Early childhood	0	5	1	0	6
Primary	0	9	2	1	12
Secondary	0	6	5	4	15
Total	0	20	8	5	33
Percentage (%)	0	60.6	24.2	15.2	100.0

Information Affordance

YouTube was regarded as a very convenient resource by the pre-service teachers. 'Sometimes, even within the education institute, it is very difficult to find suitable materials for students. Searching for teaching materials on websites such as YouTube through the Internet is much easier' (Participant 1, Kindergarten). Another pre-service teacher preferred to use multi-media in her lessons, and particularly video sharing websites: 'YouTube provides a lot of updated examples to illustrate the themes of the lessons' (Participant 2, Secondary school). A kindergarten preservice teacher noted that 'it is better to use multi-media to show videos and up to date news to teach knowledge that is continuously changing. Furthermore, it allows students to explore different types of current knowledge' (Participant 3, Kindergarten). In teaching subjects such as social studies, one pre-service teacher recommended that teachers 'need to search YouTube for current information to prepare lessons' (Participant 8, Primary school). These examples illustrate that YouTube supports teachers in their search for additional and up-to-date information. Clearly, YouTube, which is the source of the most embedded videos on the Web (Built With Technology Usage Statistics 2011), is often treated as a virtual video library by teachers.

Demonstration Affordance

The results show that demonstration affordance, which includes demonstrating the skills to be acquired or arousing students' interest or encouraging them to pay attention in class, was the most frequently mentioned affordance. A student teacher majoring in physical education pointed out that the advantage of using YouTube is that 'if the students merely watch my own demonstration, they cannot see the

Table 3 Summary of the affordances and constraints of using YouTube in teaching

	Number of references*	Number of participants
Affordances		
Information affordance		
Providing additional or remediating learning materials for students	20	12
Supporting teachers to search for up-to-date information	3	3
Demonstration affordance		
Demonstrating the acquired skills and/or their application	23	16
Open-ended constructivist affordance		
Stimulating students to discuss the learning content together in class	6	5
Stimulating students to find out information on their own outside school	4	4
Stimulating students to learn actively	9	7
Constraints		
Reliability issues	5	4
Misuse of YouTube as a substitute for teachers' teaching	2	2
Health concerns	1	1

* Number of references extracted from multiple data sources, including interviews, observations of class sessions, and relevant materials such as lesson plans

movement from all directions. But if they watch a video, they can see the movement from the top view, bottom view, or any other direction, which helps them to learn better and makes them more interested' (Participant 4, Secondary school). This teacher further reflected that YouTube can demonstrate the skills to be acquired in a way that traditional teaching cannot do. Another English student teacher recalled that, 'I saw a teacher in my placement school using YouTube to illustrate how people order food in English at MacDonalds in a foreign country. I think that is good. This teacher not only introduced the language relevant to the students' daily experience, but was also able to show them foreign cultures through the use of ICT' (Participant 18, Secondary school). These examples illustrate how student teachers use YouTube to transmit specific acquired skills through 'slice-of-life' videos, which echoes Duffy's (2008) view that ICT offers creative opportunities to share with others.

Open-Ended Constructivist Affordance

YouTube also provided opportunities for the teachers to create an open-constructivist environment for student learning. 'I surf the Internet with the children for 5–10 min

twice or three times per week. Sometimes, I may find some information to study with them. This helps to create a learning environment for me to study with my students' (Participant 5, Kindergarten). This example illustrates how teachers can serve as facilitators to guide students in the process of acquiring knowledge. Requiring students to search for a topic of interest through YouTube after class can also motivate them to learn outside of the classroom. Moreover, these opportunities are not only limited to learners but also provide a convenient and rich resource for teachers. 'As they know how to use YouTube, they will go home and watch the video that I showed them in class' (Participant 6, Primary school). It is evident that the popularity of YouTube offers an environment to scaffold teaching that gives students motivation and a specific context in which to understand the new knowledge, which will help them in future lessons.

Constraints of Teaching with YouTube

Only a few of the participants mentioned the constraints of teaching with YouTube. Four school teachers mentioned the same main difficulty: 'I cannot use YouTube for teaching because the school restricts some websites that are not safe to view, and YouTube is regarded as one of those' (Participant 17, Primary school). This indicates that schools are concerned about the safety and reliability of the Internet. The same teacher was also concerned that YouTube might sometimes be misused. 'I have seen a Mandarin teacher using YouTube to demonstrate speech instead of speaking her/himself, because he/she did not speak the language very well. I saw the students only following the video to practice. I think that the teacher was scared that he/she could not teach well' (Participant 6, Primary school).

Scope for Using YouTube

To further examine pre-service teachers' usage of YouTube, three levels of scope of their perceptions of the affordance of YouTube—basic, medium and extended—were further characterised. Table 4 shows a summary of the preservice teachers' perceptions of the scope of using YouTube in teaching. These levels of scope are classified by the number of types of affordance perceived by the participants. 'Basic scope' refers to the perception that the use of YouTube in teaching has one of the three types of affordance (i.e. information, demonstration or open-constructivism), 'medium scope' refers to two types of affordance, and 'extended scope' refers to all three types of affordance. The results show that 62.5 percent of the participants only perceived the use of YouTube in teaching as having a 'basic scope'.

Table 4 Preservice teachers' perceptions of the scope of using YouTube in teaching

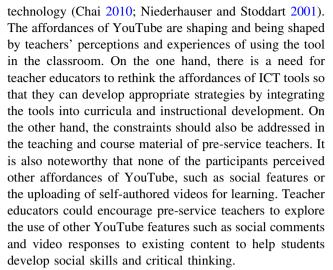|	Basic scope (any 1 type of affordance)	Medium scope (any 2 types of affordance)	Extended scope (all 3 types of affordance)
Early Childhood	3	1	2
Primary	9	3	0
Secondary	8	3	3
Total	20	7	5
Percentage (%)	62.5	21.9	15.6

Discussion and Conclusion

This study illustrates that using ICT tools in teaching is not only important for university teaching (Chen 2011; Laurillard et al. 2000), but is also important for teaching in kindergarten, primary and secondary schools. The results provide evidence to support the use of YouTube as an important and essential pedagogical tool for contemporary classrooms (see Tables 2, 3). YouTube videos were not only used by the participants to search for basic information and for the demonstration of know-how, but also to support students' development when used with appropriate pedagogical approaches. The pre-service teachers may not, however, have fully utilized this ICT tool as part of a complete student-centred teaching strategy to engage students in constructivist learning. This echoes the result of a study which suggested that Taiwanese teachers use ICT to support more traditional teaching (Chai et al. 2009). However, this study shows that YouTube is an ICT tool that both supports the computer-based transmission of knowledge as part of a traditional teaching strategy and facilitates the constructivist approach to learning.

The constraints identified by the participants reflect the need to consider and provide guidance on the pedagogical and ethical issues of using popular websites in teaching. It should also be noted that only a few participants mentioned constraints related to the limitations and reliability of using YouTube that may hinder teaching in the classroom. Other issues arising from the use of YouTube in teaching include unwanted information, excessive advertisements, inappropriate video clips, and the ethical evaluation of the video content. It is critical for teachers to consider these factors when making decisions about teaching with ICT tools or websites.

Implications of the Study

Teaching with ICT tools and YouTube does not necessarily equate to good teaching, but providing extensive technical skills, support and staff development to teachers can help them implement a constructivist pedagogy that uses

technology (Chai 2010; Niederhauser and Stoddart 2001). The affordances of YouTube are shaping and being shaped by teachers' perceptions and experiences of using the tool in the classroom. On the one hand, there is a need for teacher educators to rethink the affordances of ICT tools so that they can develop appropriate strategies by integrating the tools into curricula and instructional development. On the other hand, the constraints should also be addressed in the teaching and course material of pre-service teachers. It is also noteworthy that none of the participants perceived other affordances of YouTube, such as social features or the uploading of self-authored videos for learning. Teacher educators could encourage pre-service teachers to explore the use of other YouTube features such as social comments and video responses to existing content to help students develop social skills and critical thinking.

The results indicate that there are two priorities for further research. First, as new ICT tools are constantly emerging and YouTube is evidently a popular tool for teaching, more research is needed to investigate the influence of new ICT tools on student learning. Second, as teachers play a crucial role in facilitating student learning, educational research should investigate the feasibility of using these tools to reshape the curriculum and instructional development both in and out of the classroom (Duffy 2008; Tondeur et al. 2007). This small-scale study does not aim to generalise the phenomenon, but rather serves as an exploratory signpost that provides insights to aid the understanding of the contemporary teacher education and the development of the pedagogical use of ICT tools. It also seeks to help develop a questionnaire that enables educators to research larger populations, thereby contributing to the sustainable development of teacher education in this digital age. To sum up, the findings of this study are encapsulated by the following critical reflection from one of the pre-service teachers on the use of Internet-based ICT tools in teaching:

> After my teaching practicum, I realized that ICT and Internet culture have such a significant influence on learning and entertainment for school kids. However, violence and pornography have penetrated these free resources, and have aroused the younger generation's curiosity. What is important is not only teaching students to learn the subject knowledge through the resources but also to frame an ethical, reflective mindset for the selection and review of those resources.
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> (Participant 10, Primary school)

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