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What are the affordances of BYOD (Bring Your Own Device) for learning from teachers' perspectives in higher education?

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Abstract: This paper reports on a study aiming at examining the affordances of BYOD (Bring Your Own Device) for varied pedagogical practices from teachers' perspectives in higher education. Seventeen teachers from eight departments and centers participated in the one-year study. The affordances and constraints of BYOD were examined under the "framework of affordances and constraints in BYOD-supported learning environment". Data collection included class observations, class videos, field notes, resources on the BYOD website and teaching plans. Content analysis was adopted in the data analysis. The research findings identified seven types of BYOD conceptualized affordances. Discussions are made.

Keywords: Affordances, BYOD, higher education, teachers' perspectives

1. Introduction

Mobile devices have been embedded in higher education settings. Paralleled with it are the increasing trials of adopted BYOD (Bring Your Own Device) model in higher education (e.g., Dennen & Hao, 2014; Kobus, Rietveld, & Van Ommeren, 2013). BYOD refers a technology model where students bring a personally owned device to support their studies. Academics are exploring effective ways of integrating BYOD into student study lives both in and out of classes. However, frequently reported from these studies are the ethical and security issues related to BYOD use in higher education (e.g., Kobus et al., 2013). Few studies have reported what BYOD can offer from the perspective of practitioners in higher education. Thus, this study aims at exploring the affordances of BYOD for pedagogical practices from a group of teachers who are involved in the teacher professional development project of "BYOD for reflective engagement of learners in digital classrooms".

2. Related literature

2.1 BYOD in higher education

Many studies have investigated student perceptions on learning with mobile devices in higher education (e.g., Gikas & Grant, 2013). However, it is reported that teacher-led adoption of BYOD in higher education remains scant (Dennen & Hao, 2014). Moreover, studies show that many teachers are reportedly reluctant to use new technologies in their teaching due to various issues such as lack of competency in terms of technology use and pedagogical design, resistance in technology use, and lack of technical support (Dennen & Hao, 2014). Thus it is important to develop a teacher community to explore the affordances of BYOD for teaching and learning.

2.2 Affordances of mobile technologies in education

Gibson (1979), from an ecological perspective posits that affordances are relational properties between the agent and the environment. While, Kaptelinin and Nardi (2012) propose understanding technology

affordances from a social-cultural perspective as "possibilities for mediated human action (p. 975)". Based on the definition of technology affordances, in this paper, the authors define affordances of BYOD as "possibilities of adopting BYOD for mediated pedagogical practices" where pedagogical practices refer to teaching and learning activities.

The concept of technology affordances has been used in the area of information communications technology (ICT) to explore the possibilities that the educational technologies provide for students in ICT-rich learning environments (e.g., Song, 2013). However, the majority of the studies have either explored the affordances of designed tools on mobile devices for learning (e.g., Dennen & Hao, 2014) or affordances of mobile devices from student perspectives (e.g., Song, 2013). Few studies have examined the affordances of BYOD from the perspective of teachers. Understanding the affordances of ICT and its evolution in pedagogic practices helps support learners as they learn, and teachers as they make decisions on the adoption of new technologies.

2.3 Framework of affordances of BYOD in higher education

Affordances of BYOD cannot be perceived and used in isolation from what happens in the learning environment as a whole. Adapted from van Lier (2004)'s affordances in context framework (p. 96), we developed the framework of affordances in BYOD-supported learning environment (see Figure 1).

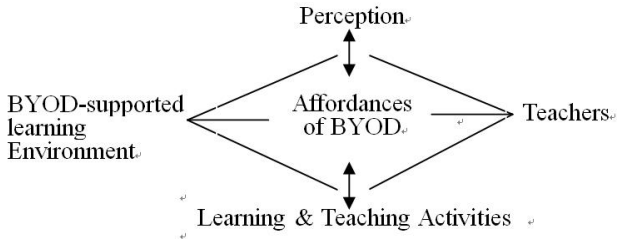

Figure 1. Framework of affordances of BYOD-supported learning environment

Figure 1 shows that teachers, the BYOD-supported learning environment, perception, learning and teaching activities and affordances of BYOD are all relational. In addition, perception of the teachers in the BYOD-supported learning environment for specific learning and teaching activities influence the adoption of affordances of BYOD to mediate pedagogical practices; on the other hand, specific learning and teaching activities in the BYOD-supported learning environment may also influence the teachers' perception of the adoption of affordances of BYOD. In this study, affordances of BYOD to mediate teaching and learning are examined from teachers' perspectives under this framework.The research question is: What are the affordances of BYOD for learning and teaching in Higher Education from teachers' perspectives?

3. Research methods

This study situates in a 2-year research project "BYOD (Bring Your Own Device) for reflective engagement of learners in digital classrooms". This paper reports on the research results obtained from the first year's study.

3.1 Participants

Participants were recruited through the institute-wide email invitation for voluntary participation in the project. In the first semester, 13 teachers joined the project and in the second semester, another 4 teachers joined the project. Thus there were 17 teachers in total as BYOD project members involved in the first-year project. The teachers numbered from 1 to 17 were from different departments or centers at a higher education Institute. Four teachers had 1 to 3 years' experience in teaching with mobile technologies. The rest had no prior experiences. They took 22 courses in total involving 520 students. A few teachers took more than one course in the project. A BYOD website was designed for community building and BYOD implementation support, where an introduction to the project, featured activities,

and BYOD resources (sample teaching schemes, BYOD class video clips and various apps for BYOD) were provided.

3.2 BYOD-supported learning environments of the 17 teachers

Learning environment, in a broad sense, relates to almost everything in the pedagogical practices. In this paper, regarding the BYOD-supported learning environments, we focus on the physical facilities (e.g., WiFi), the courses taken by the teacher and the BYOD apps or learning platform that the teacher adopted for different purposes. Among the 17 teachers, except Teacher 14 and Teacher 15, all the other teachers took different courses, but some of them adopted the same apps. For example, 8 teachers chose Moodle and 6 teachers chose Edmodo as the learning management platform and social learning platform respectively. In addition, Google Drive and QR Code apps were also adopted by a few teachers.

3.3 Data collection and analysis

Data collection includes class videos, teacher interviews, field notes, teaching plans and resources on the BYOD website. The BYOD project members were suggested providing at least one teaching plan for a lesson for class observation and videotaping in the first year, where field notes were taken. Some teachers were videotaped more than one lesson. There were totally 22 class videos and field notes collected. In addition, 17 individual teacher interviews were conducted to understand teachers' perceptions of BYOD for teaching and learning. The teacher interview included questions of BYOD advantages for learning and teaching, and teacher attitudes towards using BYOD for learning and teaching. Teaching plans were collected from teachers prior to their enactment of the BYOD lesson. The BYOD website includes data such as sample teaching schemes and BYOD class video clips.

In the data analysis, all the teachers' class videos were reviewed, focusing on examining the affordances of BYOD in pedagogical practices. Drawing on pattern-clarification strategies for identifying themes and patterns (Huberman & Miles,1994), categories of affordances were coded. All the teacher interviews were transcribed to understand the teachers' perceptions of the affordances and constraints of BYOD for learning and teaching. The affordances of BYOD were triangulated by teaching plans, teacher interviews, field notes and resources on the BYOD website. Table 1 shows the data collection and analysis for addressing the research questions.

4. Results: Affordances of BYOD for learning and teaching

Seven types of affordances of BYOD were conceptualized for varied learning activities. They are: resource access tool, communication tool, resource collection tool, resource submission tool, construction tool, resource sharing tool, representation tool and augmented reality tool. These tools were adopted in a range of learning activities for instructional, referential, reflective, explorative, collaborative, interactive, socializing, submitting, constructive and visualizing purposes.

To get a better understanding of how the 17 teachers made use of the affordances of BYOD, we put the tools adopted by the teachers for various learning and teaching activities in Table 1. Table 1 shows that resource access is the mostly reported uses of BYOD affordances for varied learning and teaching activities (9 reported cases); and representation is the least reported use (3 reported cases).

Table 1. Affordances of BYOD and their uses by the 17 teachers.

Teacher / Affordance	Resource Access	Communication	Resource Collection	Resource Submission	Knowledge Construction	Resource Sharing	Representation
1	Reflective Referential	Collaborative Informative		Submitting		Reflective	
2	Explorative Interactive		Reflective	Submitting	Constructive	Collaborative	Visualizing
3		Collaborative	Reflective				
4			Reflective	Submitting			Visualizing
5						Collaborative	Visualizing

6	Referential				Constructive		
7						Collaborative Reflective	
8	Referential					Collaborative Reflective	
9	Explorative			Submitting	Constructive	Collaborative	
10		Collaborative				Collaborative	
11					Constructive		
12	Referential						
13		Socializing Collaborative					
14	Instructional Referential Collaborative	Reflective		Submitting	Constructive		
15	Collaborative				Constructive		
16						Reflective	
17	Referential Collaborative						

We also summarized the 17 teachers' perceptions of the advantages of BYOD and their attitudes towards BYOD-supported pedagogical practices. By comparing the perceptions of the teachers with the affordances of BYOD they used in the BYOD-supported learning environment, it is noted that the teachers' perceptions are consistent with the affordances of BYOD adopted in their pedagogical practices. It is noted that Teachers 1, 2, 9 and 14 perceived very positively about how to adopt the affordances of BYOD to mediate their pedagogical practices not just in one lesson but in the entire course they taught. Teacher 1 reported that with BYOD, he was able to be connected with the students on Edmodo social network platform, and engage them in learning activities anytime, anywhere throughout the course; in addition, the online learning activities mediated by BYOD left "footprints" that helped students with their reflective learning and helped teachers with refinement of pedagogical designs. Teacher 2 reported that with BYOD, she could enact mobile and seamless learning using project-based learning approach more effectively in the whole course on the learning management platform - Moodle and using different apps such as Google Drive and QR code as tools for varied teaching and learning purposes. Teacher 9 reported that he had been using the affordances of mobile devices in his pedagogical practices for over 2 years, including the sample lesson provided for us. In his course, he always encouraged students to use BYOD to access the learning platform - Moodle and apps such as Moodle, Wiki Book, Google Translate, and Moviemaker to access, construct, create and share their artifacts. Teacher 14 had been keen on mobile technology use to engage students in their language learning for over one year. In the sample lesson, she utilized the affordances of Moodle, Google Drive and Socrative to mediate various pedagogical practices. This indicate that Teachers 1, 2, 3 and 4 perceived the pedagogical value of BYOD and had the motivation and capabilities to use a range of affordances in their practices in the BYOD-supported learning environment.

While, the other 13 teachers, also perceived and acted on affordances BYOD for learning and teaching , but centred on using an app or a platform for task-based activities as a trial teaching practice without continued intention, perception and action on the BYOD affordances to mediate learning and teaching activities

5. Discussions

The results of this study show that the 17 teachers from different departments designed different learning activities in BYOD-supported learning environments using different apps, they had different perceptions of the adoption of BYOD in teaching and learning, and the affordances of BYOD employed by the teachers are diverse. It is noted that some teachers adopted a range of affordances of BYOD in learning and teaching; while others only adopted one or two affordances. This study shows that to perceive and actualize the BYOD affordances to mediate learning and teaching activities, on the one hand, the environment needs to enable the BYOD to be employed in the environment; on the other hand, the intention and capabilities of the teacher in taking the pedagogical actions are also critical (Jonassen, Hernandez-Serrano, & Choi, 2000). Nevertheless, Dennen and Hao (2014) report that teachers are reluctant to accept mobile technology supported innovative approaches because these are deemed

complex and contradictory to their routine pedagogical designs. Thus, teacher professional development is needed in this regard to empower teachers in innovative practices with new technologies.

In addition, the capabilities for perceiving and acting on BYOD affordances can be increased in the pedagogical practices. This study shows that the teacher's capabilities of perceiving and acting on the BYOD affordances can be increased when s/he is increasingly involved in the innovative pedagogical practices because the affordances adopted in the earlier events can be employed to transform the nature of later events (Song, 2013). This indicates that teachers need to be exposed to more BYOD mediated pedagogical practices to enable them to perceive and employ more affordances.

6. Conclusions

This study reported a study involving 17 teachers' perceiving and acting on affordances of BYOD for pedagogical practices, and conceptualized 7 affordances of BYOD for varied learning purposes. This research study is exploratory in nature, and is by no means meant for generalization. Nevertheless, affordances of BYOD explored in this research shed light on what BYOD affordances teachers prefer, and how teachers adopt and adapt the tools for learning and teaching. This, in turn, may help inform researchers and teachers of how to take advantage of the affordances of BYOD in their pedagogic practices in higher education.

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