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Barriers influencing teacher's technology integration in their teaching practice.

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ABSTRACT

Teachers are expected to integrate technology in their daily teaching and learning practice. However, despite the implementation of some technological reform and project to support teacher's technology integration, the integration by teachers continues to be limited. This paper therefore discuss some barriers that teachers face in their effort to integrate technology. First order barriers related to technology facilities and time constraint were reported by teachers, which consequently influences the second order barriers related to teachers belief and decision to integrate technology. This finding has directed into further work that take into consideration how teachers could negotiate these barrier through participation and engagement inschool Communities of Practice.

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INTRODUCTION

In this 21st century, teachers all over the world, including Malaysia are expected to integrate technology meaningfully in their classroom. In Malaysia, an educational reform called the Smart Schools Project was introduced in 1999 to support the national innovation on technology integration. In this project, select schools are funded by the government for the purpose of providing a technology-rich teaching and learning environment(Hamzah, Ismail, & Embi, 2009; Lubis, Ariffin, Muhamad, Ibrahim, & Wekke, 2008). In recent years,an integrated learning solution for the school teachers and administrators was introduced. A virtual learning environment, named Frog VLE is a cloud-based platform which aims of this project is to provide "flexibility and mobility beyond schools". Using this platform, "files and data saved on the cloud can be accessed anywhere, anytime with an Internet connection" (Ministry of Education Malaysia, 2014). However, despite the implementation of the Smart School reform for more than a decade, and the newly invented project, technology integration by teachers continues to be limited.

An evaluation of the Smart School pilot project by the Multimedia Development Corporation (2005)reported that although the project as a whole was considered to be a success, the teachers' use of ICT in the classroom was minimal. This finding was supported by several independent studies conducted by Malaysian researchers involving Smart Schools which reported that technology integration practices among teachers were not encouraging (e.g.,Wan Ali, Mohd. Nor, Hamzah, & Alwi, 2009; Ya'acob, Mohd Nor, & Azman, 2005). In this regard, a number of barriers to technology integration were reported to explain why teachers are not integrating technology in their T&L.

Literature Review:

Previous studies have indicated the benefits of using technology to improve the outcomes of student learning (e.g., Hartley, 2007; Newhouse, 2002; Rovai, Ponton, Wighting, & Baker, 2007;Wang, 2009). However, studies continue to indicate that teachers use of technology in the classroom are minimal, such as low level of technology used, teacher-centered approach, and lack of meaningful engagement in collaborative activity(Cuban, Kirkpatrick, & Peck, 2001; Hadley & Sheingold, 1993; Mahmud & Ismail, 2010; Ward & Parr, 2010). This concern on the low level of technology integration among teachers have prompted researchers (e.g., Bauer & Kenton, 2005; Ertmer, 1999, 2005; Pelgrum, 2001;Vannatta & Fordham, 2004)to investigate barriers that influence teachers decision to integrate technology in their teaching and learning.

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Obstacles or barriers for integrating technology are mainly categorised into first-order barriers and second-order barriers (Bai & Ertmer, 2008; Bauer & Kenton, 2005; Bingimlas, 2009; Chen, 2008; Cher Lim & Khine, 2006). First-order barriers refers to obstacles that are extrinsic to teachers, such as the institutional factors, or typically described in terms of the resources (e.g., equipment, time, training, support). Second order barriers are factors that "interfere with or impede fundamental change" and "typically rooted in teachers' underlying beliefs about teaching and learning and may not be immediately apparent to others or even to the teachers themselves" (Ertmer, 1999, p. 51).

The assumption that integration would follow once adequate resources were obtained was not reliable (Cuban *et al*., 2001; Ertmer, 1999). Ertmer (1999)asserts that "even if every first-order barrier were removed, teachers would not automatically use technology to achieve the kind of meaningful outcomes..." (p. 51). In this regard, second-order barriers may also affect teachers technology adoption and integration in their teaching practice (Ertmer & Ottenbreit-Leftwich, 2010; Vannatta & Fordham, 2004). Although the second-order barriers are are more complicated and less tangible than the first-order barriers, literatures suggest that these barriers are common in today's teachers and continously reported in the later literature. For example, studies have found that second-order barriers such as teachers' attitudes towards technology (Wozney, Venkatesh, & Abrami, 2006) and teachers' pedagogical beliefs about technology (Ertmer, 2005; Inan & Lowther, 2010; Cher Lim & Chai, 2008; Palak & Walls, 2009) have impact on teachers technology integration practices. Teacher's beliefs about teaching and learning may influence their classroom practices including teaching methods, organizational and management styles, and assessment procedures (Ertmer, 1999). In addition, teachers' belief about the usefulness of and the ease of use of a particular technology may influence whether to integrate or not to integrate technology in their teaching practices (Ertmer & Ottenbreit-Leftwich, 2010; Inan & Lowther, 2010; Vannatta & Fordham, 2004). This suggest that technology integration is a complex practice as it involves numbers of affordances and constraints in its implementation (Lloyd, 2005; Windschitl & Sahl, 2002).

Within the Malaysian context, both first- and second order barriers were also continously reported in the literature. Following are the frequently cited factors which influence the technology integration among teachers in the Malaysian schools as reported in several studies (Bakar & Mohamed, 2001; Darus & Luin, 2008; Lau & Sim, 2008; Mahmud & Ismail, 2010; Samuel & Abu Bakar, 2006; Wan Ali *et al*., 2009). The first is related to the first-order barriers, whilst the second is considered as the second-order barriers.

i. Limited access to computer and technical support, lack of technology training, and lack of time.
ii. Teacher's knowledge, attitude, perception, beliefs and commitment towards technology

These barriers to integrate technology that faced by teachers worldwide has pointed out that there are a range of influencing factors that may be apparent within, or influence teachers' technology integration in the school. This paper therefore discusses major barriers that teachers faced in their effort to integrate technology.

Methodology:

This study involved ten teachers in Perdana Secondary School (pseudonym), a Smart School in the northern peninsular of Malaysia. Three of the teachers (the principal, the ICT coordinator and the ICT teacher) identified themselves as part of an ICT leadership group in which they were involved in the school's administration and directly involved in the ICT planning and implementation. The other seven participants consisted of two teachers from the English department and five from the combined Science and Mathematics department. All names used in this paper are pseudonyms.

It is important to note here that this paper is part of a larger qualitative study exploring how teachers learn to integrate technology from a Communities of Practice (Wenger, 1998) perspective. A case study methodology was employed in which data collection included observations, semi structured interviews, and gathering teachers' lesson plans, teaching materials, school policies and other technology related documents. The observations included teachers' interactions in whole school staff activities such as meetings, teacher interactions in staffrooms and in other locations such as the school's cafeteria and library. Individual teachers were interviewed for approximately 45 minutes. A further 20 minutes interview was conducted with some of the teachers for further clarification.

This study adopted a theory-driven thematic analysis in which several key concepts from the Communities of Practices (Wenger, 1998) were use as the analytical framework. In this study, I explore the elements of mutual engagement, joint enterprise and shared repertoire (Wenger, 1998) that contribute to teachers' learning to integrate technology. In this paper however, discussion on the these three elements of CoP is not much because this paper only discusses key themes identified from the data which related to barriers that teachers face to integrate technology in their classroom.

Findings:

The analysis of the data revealed that teacher participants in my study used a range of technological tools and applications in their teaching and learning practices. In terms of the technological tools (i.e., hardware), teachers mostly mentioned the use of computers and LCD projectors as their common technology integration

practices. Teachers also mentioned several applications that they normally used in their teaching and learning. These include Microsoft Power Points, courseware provided by the ministry, and some application or materials downloaded from the internet.

Although teachers in my study were only using basic technology facilities such as computers and LCD projectors, and some common applications such as Microsoft Power Point and the Internet, they did highlighted that they were trying their best to integrate technology in their teaching practices. Teachers however faced many challenges or barriers in their effort to integrate technology in their teaching. It was found that teachers are mainly concerned about the contextual or organizational factors that influenced their technology integration or what is called as first-order barriers, or obstacles that are extrinsic to teachers (Ertmer, 1999, p. 50). Two factors related to first order barriers have been identified in my study; (i) lack of technology facilities and maintenance support for integrating technology, and (ii) lack of time for preparation. In relation to these factors, there was also an issue related to student's readiness to learn in an ICT integrated lesson as a result of lack of technology facilities. Further analysis of the data revealed that these two factors also contribute to the second order barriers that are related to teacher's belief towards integrating technology and teacher's decision to integrate technology.

Lack of technology facilities and support:

Teachers highlighted the lack of technology facilities as the main reason why they do not integrate technology, or why they could not easily integrate technology in their teaching and learning. For example, Azlina and Hanita reported:

We don't have [data] projector in the classroom. So here I haven't do anything using ICT actually accept for that email thing. (Azlina, English teacher)

[Technology] facilities in the classroom are very limited. No LCD [projector], so it is difficult to use computer in the classroom. (Hanita, Science and Maths teacher)

In these instances, Azlina and Hanita stressed that the lack of ICT facilities especially on the availability of data projectors in the classroom makes it difficult for them to integrate technology in their lesson. Although teachers in Perdana Secondary School can bring their own laptop and borrow portable data projectors from the ICT department, teachers rarely do that. This is because the portable data projectors available were very limited and teachers have to make bookings if they want to use it.

Another issue that closely related to the availability of technology facilities raised by the teachers was about the maintenance of the technology itself. Even though there were some facilities such as computers and data projectors available at school, teachers were frustrated that some of the facilities available cannot be used because it was out of date or lack of maintenance. Hanita said:

Some of the LCD [data projector] that we have is already broken, the bulbs, or whatever they call it, are very expensive to be replaced. So, I think proper maintenance is important; otherwise it's difficult for us to use the facilities.

Iskandar also discussed the same issue, relating the importance of having well maintained and upgraded facilities with the current technology standard:

In this school, the computer we use today, it's almost obsolete tomorrow. Because the maintenance and also the upgrading are very slow, that's why sometimes we being stagnant there.

Iskandar also noted that most of the computers that available in the schools were provided during the Smart School projects. Since the project was started a decade ago, in 1998, most of the computers have become outdated; not operating well and some were just abandoned because no proper maintenance and replacement system were available.

Consequently, these first order barriers have consequently influence the second order barriers that is teacher's belief. Teachers in this school shared a belief that the availability of the technology is important in order for them to use technology in their teaching and learning. It also influence teachers decision whether to use technology or not in their teaching. For example, because the facilities that were available are limited, and maintenance is not always available, there were teachers who do not want to be blamed for any damages and therefore choose not to use the resources available at school. This was noted in Syahril response:

I use whatever sources that I have at home, print the materials out and make lots of copies for the students. … I rather not use the school resources much, because once it went bonkers, my head will be on the chopping board. People talk.

This finding on lack of technology facilities and support is consistent with some findings from previous studies. Issues related to lack of technology facilities for integrating ICT in teaching and learning has become a major finding in previous studies conducted in Malaysian schools (eg: Md Yunus, 2007; Wan Ali *et al*., 2009) and still evident in my study. Several researchers also found that the successful of teacher's technology integration is influenced by the availability of ICT resources and support (Md Yunus, 2007; Mumtaz, 2000; Pelgrum, 2001;Wan Ali *et al*., 2009).

In this study, although Perdana Secondary School is a Smart School that is supposed to be well equipped with technology facilities for teaching and learning (Abdullah, 2006; Multimedia Development Corporation,

2005), this study has revealed that this was not the case. Although, the facilities that are available in the school might be much better compared to other non-Smart Schools, teachers in this study perceived or had a belief that the availability of technology facilities are not good enough to enable them to integrate technology in their teaching and learning.

Time Constraint For Preparation and Implementation:

In my study, factors related to lack of time for integrating technology were also reported by the teacher participants. For example, Raihan was concerned about time constraints in preparing the materials. He noted that*:*

One thing you should know about [Perdana Secondary School] is this school is a very, very busy school. So, I think the biggest challenge is time."

Interestingly Raihan also revealed that the lack of time (first-order barrier) is associated with his pedagogical beliefs (second-order barrier) on what teachers should do when they want to use technology in their teaching. This could be seen in the following extract when he continues to discuss about the needs of time:

Teachers need some time to go through a few mediums of IT, to go through a lot of materials, to find out the suitable one and then for them to evaluate on the effectiveness of the materials, only then they can consider of using it or integrate it into their classroom teaching and learning process. However, you have to be very, very fast if you want to do that because as you can see teachers are running down and up the stairs, having to be at two or three places at the same time.

Teachers also discussed about time constraints for implementing ICT based lesson in the classroom. Azlina for example was frustrated that her plan to do a weblog project with her studentswasnot successful due to access and limited teaching hours to implement the project. According to Azlina, she tried to do blogging once, but it was a failure because most of the students did not have access to the Internet and they have limited time in school to do the project during the English hours. Azlina mentioned that:

You know what, the most is double period which is only 80 minutes, on normal day, but on assembly day, less than 80 minutes, so to prepare the things, the tools like 5 to10 minutes, and then for the students to come into the room [ICT lab], another 5 to 10 minutes. So, there's no many times left.

Teachers also associated the lack of technology facilities with the constraint of time. This is noted in Syahril response, which consequently influence their decision whether to integrate technology or not:

In the classroom, I prefer doing 'chalk and talk'. One period is only about 30 to 40 minutes. Setting up computer and other things are just time consuming.

These issues related to time constraint as discussed by Azlina and Syahril were very much related to the technology facilities as discussed above because they mostly discussed about time for setting up the technology tools. In this regard, they were suggesting that if the technology facilities are ready in every classroom, they might have no difficulties to integrate technology in their teaching. This challenge related to time constraint that teachers in Perdana Secondary School face to integrate technology was similar to what was found by Cher Lim and Khine (2006) in Singaporean schools. They found that teachers were having difficulty conducting lessons using ICT within short fixed time periods due to occasional ICT problems. In addition, the findings of this study that show a connection between the first order barriers with second order barriersalso consistent with previous studies that reported teacher's belief about how easy to use a particular technology may influence teacher's decision whether to integrate or not to integrate technology in their teaching practices (Ertmer & Ottenbreit-Leftwich, 2010; Inan & Lowther, 2010; Vannatta & Fordham, 2004).

Conclusion And Further Work:

This paper has discussed on two major obstacles or barriers that teachers faced in their effort to integrate technology in the teaching practices. These barriers which referred to first order barriers are lack of technology facilities and support, and time constraints for preparation and implementation of ICT integrated lesson. In my study the finding also suggest that these first order barriers have influenced on teacher's belief towards integrating technology and their decision whether to use technology or not, what technology to be used, and how they should use a particular technology in their teaching practices (i.e., second order barriers).

From the CoPs perspective (Wenger, 1998), these barriers perceived by teachers are part of their participation and reification of their technology integration practices in the school communities of practice. It also part of teacher's negotiated enterprise of integrating technology in this particular school's CoP. In negotiating this enterprise, teachers have to consider all of these factors or barriers to plan and implement their technology integration, to what extent they should integrate technology and why they could or could not integrate technology in their teaching practice. In this regards, it is important to consider that the way teachers respond and enact to these barriers are also part of teacher's negotiation in the school CoP.

Further analysis of this study (not discussed in this paper) has taken into consideration that teachers negotiation of the joint enterprise to integrate technology, their mutual engagement and the shared repertoire they developed as a mediating factor that would contribute into teachers learning to integrate technology. One

implication of this study to be noted here is, it is important to consider teacher professional development to strengthen teachers capabilities to overcame barriers they faced (and other issues related to technology integration) within teachers CoP that already in place in the school setting. As the first order barriers are intertwined with the second order barriers, eliminating first order barriers along with strengthening teacher's positive belief about integrating technology through negotiation and shared practice in the school CoP is important.

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