BARRIERS TO TECHNOLOGY INTEGRATION FOR TEACHERS IN THAI-CURRICULUM SCHOOLS

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Abstract: *Education reform with technology use has been in the works since the 1997 Constitution of Thailand, but Thai student achievement has not improved overall. This research investigates any influence of Technology Integration barriers that are external and internal to the teacher, on their intention to integrate technology in the classroom. 105 teachers of Thai-curriculum schools were sampled, and their data was collected by Technology Integration Barrier Survey (TIBS). Multiple Linear Regression was used to find relationships between external and internal barriers to teachers' behavioral intention to integrate technology in the classroom, respectively. The result was teachers did not face strong external or internal barriers, with only a temperate level of intention to integrate technology in the classroom. Internal barriers were found to influence teachers' intention to integrate technology. This research recommends continued but heightened teacher support and technological leadership training to maintain and bolster technology integration above present levels, and further research to explore other influences on student achievement.*

Keywords: *Technology Integration Barrier, Thai Education Reform, Meaningful Learning*

1. INTRODUCTION

This study focuses on the barriers that may obstruct technology integration for teachers employed in Thai-curriculum schools. The following are issues of technology and people, its influence on education, and importantly, views of such notions in Thailand's setting.

Technology redefined people's way of life. The digital world is expanding vastly, as the number of internet users for instance, increased aggressively from 800 million users in 2004 to 1.97 billion users in 2013. (Lim, Zhao, Tondeur, Chai, & Tsai, 2013). People consume information through online sources and digital devices (Haller, as cited in Lim et al., 2013, p. 61). National Coalition to Prevent Child Sexual Abuse and Exploitation (2013) stated that children spend over eight hours per day on internet devices.

Consequently, differing views exist in the education community regarding students and technology. Some teachers view that this technological age degraded students' attention span and is inconvenient to teaching, while some believe that technology engages students and using the internet makes them better researchers (Richtel, 2012). Though present in classrooms, technology can only contribute to the learning process as much as the teachers are able to integrate it with the cognitive process, as inferred from the "Four-Stage Model" (McKenzie, 2012). It is the teachers' view on student learning and teaching that influences the adoption of technology in such a manner (Rosen & Nelson, as cited in Jacovcevic et al., 2009, p. 2).

Thailand recognized early on that technology should be utilized in teaching and learning to boost the nation's economic competitiveness, but Thai student achievement has not improved.

The 1997 Constitution of Thailand stipulated changes in education management but most importantly, changes in the classroom environment. The student-cantered classroom is favoured over teacher-centered, as the country needed a "learning society" (Atagi, 2011, p.3) where students learn from "knowledge-based sources" through technological advances (Saowapon, Laohajaratsaeng, Thammajinda, & Singharajwarapan, n.d., p.2). For these motivations, Thailand has since been working on education reform by assimilating into an IT society (Atagi, 2011, p.2). However, it has been evident that there was relatively little improvement in student achievement. Program for International Student Assessment (PISA) indicated that in 2000, only 26% of Thai students could link their reading to everyday knowledge, and this worsened in 2003 (Atagi, 2011). In 2012, students were behind in science, math, and reading (Fry, 2013), and 2015 showed no improvement as reported by PISA (Mala, 2016).

1.1 Purpose of the Study

Studies have shown that technology integration is linked to constructivist learning (Roblyer & Edwards, as cited in Schoepp, 2004, p. 10) and student achievement (Rinelli, 2013). This prompted the question of whether technology was truly being integrated into classroom learning in order to yield a student-centered environment for truly meaningful learning. Thus, the purpose of this study is to investigate any technology integration barriers that may be curbing teachers' intentions to integrate technology in the classroom, in order to gain an understanding of the problem and suggest solutions to increase students' meaningful learning and achievement.

2. Literature Review

The complementary relationship between technology integration and constructivist pedagogy are presented before the barriers to technology integration are highlighted.

Technology integration is best described as a process, where teachers find an efficient way to use technology that serves learning by scaffolding (Ruggiero & Mong, 2015, p. 168), as opposed to the use of specific tools for minimizing time and workload. For instance, to suggest the same benefit for students, social studies teachers in a workshop used a software program that allowed them to create virtual tours and field trips in a setting of their choice, which proved to be a meaningful learning experience (Rinelli, 2013, p. 18). "Mindtools" are computer software such as Microsoft Access, Excel, and PowerPoint that can be used to construct knowledge through critical thinking under proper teacher guidance (Juniu, 2006). Other specific software and the bare internet itself can serve the same agenda for students in a technology-integrated lesson. This practice by default mirrors constructivist approaches (Schoepp, 2004, p. 10), and a true learning environment is created (Nanjappa & Grant, 2003, p. 40) where learning becomes student-centered, active, collaborative, and contextualized (Watts, 2009, p.48-49). The result is that students are actively engaged in the classroom and think critically by participating in decision-making (Stanley, n.d.). Efforts to refine and implement technology integration is illustrated in the schematic of *Figure 1* below.

A problem for technology integration is that teachers may still experience barriers that turn them away from integrating technology in their lessons. Some teachers exhibit little Technological Pedagogical Knowledge (TPK) and Technological Content Knowledge (TCK) (Messina & Tabone, 2013) as they are important prerequisites to technology integration. In other words, teachers may know technology, content material and pedagogy, but are not pedagogically combining them. Personal beliefs which are that technology is not suitable for certain subject material and that personal methodologies reign supreme are barriers as well (Ertmer, as cited in Watts, 2009, p. 40).

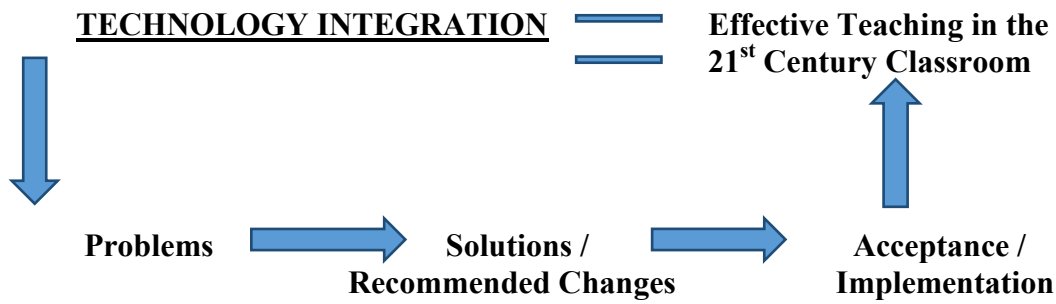

Figure 1: Technology Integration Schematic

Throughout literature, barriers could be categorized as external and internal. External barriers are extrinsic to the teacher such as a lack of resources, professional training, and administrative support as several studies have determined (Schoepp, 2004; Ertmer, as cited in Ruggiero & Mong, 2015; Hew & Brush, 2007). Internal barriers are intrinsic to the teacher. They involve teacher attitudes towards computers, resistance to change, lack of computer skills and a lack of vision as to how to integrate technology into the learning environment (Schoepp, 2004). Findings from Hew and Brush (2007) and Ertmer, Ottenbreit-Leftwich Sadik, Sendurur, E., and Sendurur, P. (2012) concur that such "attitudes and beliefs" and lack of "knowledge and skills" as they call it, hindered technology integration. Though labelled differently and written with varying specificity, these are the general themes for external and internal barriers that have transcended time through several studies and those of their references. For instance, Jacobsen (1998) considered external barriers expressed as, "there is not enough time in the course schedule for computer-related instruction" and internal barriers such as, "computers do not fit the course or curriculum that I teach", which are all based on barriers considered by Hadley and Sheingold in 1993. This is some of the vast literature considered to legitimize the framework of which this study is conducted and barriers prescribed.

The researcher aimed to determine whether the intention to integrate technology of teachers in Thai-curriculum schools is influenced by technology integration barriers, hence exploring a possible link to low student achievement. The categorization of internal and external barriers was adopted. External Barrier is the independent variable consisting of barriers of Support, Training, and Resources. Internal Barrier is the other independent variable composed of barriers of Teacher Beliefs, Teacher Knowledge and Skills, Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Attitude towards Technology Integration (ATTI). The latter three barriers are based on the Technology Acceptance Model (TAM) from a study about the acceptance of technology of pre-service teachers (Teo, Fan, & Du, 2015). TAM, developed in 1989 by Davis, Bagozzi, and Warshaw, is very crucial to the notion of barriers, as it models how a person perceives and considers the actual use of a system. This actual use is reflected in this study as the intention to integrate technology, which is the dependent variable of Behavioral Intention to Integrate Technology in the Classroom (BIITC). Exhibiting BIITC, teachers would make what Vannatta and Banister (n.d.) calls, "administrative and instructional uses of technology". These research findings regarding veteran barriers and their strong links with technology integration are suitable for testing in the Thai education setting so that more clarity and insight may be exposed about the student achievement problem, and better and refined solutions for education reform can be suggested.

3. METHODOLOGY

The methodology in conducting this study is as follows. 105 teachers of Thai-curriculum schools were purposively sampled, surpassing the minimum of 64 as determined by a G*Power analysis. Technology Integration Barrier Survey (TIBS) was developed to collect the data. With the approval of each school, TIBS was sent electronically to their administration for distribution to teachers. The data was analyzed with Multiple Linear Regression using the PSPP statistical software to determine the independent variables' (External Barrier and Internal Barrier) strength as predictors of the dependent variable (BIITC).

The two research questions are:

1. Do external barriers influence teachers' Behavioral Intention to Integrate Technology in the Classroom?
2. Do internal barriers influence teachers' Behavioral Intention to Integrate Technology in the Classroom?

Accordingly, the hypotheses tested were as follows:

H_{01}: External Barrier consisting of Support, Training, and Resources does not influence teachers' BIITC.

H_{a1}: External Barrier consisting of Support, Training, and Resources has an influence on teachers' BIITC.

H_{02}: Internal Barrier consisting of PU, PEOU, ATTI, Teacher Beliefs, and Teacher Knowledge and Skills does not influence teachers' BIITC.

H_{a2}: Internal Barrier consisting of PU, PEOU, ATTI, Teacher Beliefs, and Teacher Knowledge and Skills has an influence on teachers' BIITC.

4. RESULTS AND DISCUSSION

Descriptive data results are summarized here. Of N = 105 participants, there were 51 females (48.6%) and 54 males (51.4%). Data from demographic question items is shown below in *Table 1*, with only the highest frequency. The majority of participants is in the age range of 25-29, and mostly have been teaching for no more than two years. They are in the younger generation and are likely technologically inclined.

Table 1: Descriptive data summary of highest frequencies per question category

	Frequency	**Percent**
Age Range: 25-29 years	40	38.1
Nationality: Thai	31	29.5
Teaching Experience: 0-2 years	27	25.7
Subject Area: Language Arts	32	30.4

Note: N =105

Participants indicated their level of agreement with TIBS positive statements on a Likert scale where 5 = strongly agree, 4 = agree, 3 = uncertain, 2 = disagree, and 1 = strongly disagree. An interpretation scale devised allowed the researcher to assess the level of participants' agreement from the means shown in *Table 2*. At a mean of 3.30, Training is the only variable showing that most participants feel they are uncertain whether they are receiving relevant and/or

adequate training. The results for mean indicate that participants are not facing strong barriers except for their uncertainty with Training, and that they also agree in having some level of intention to integrate technology in the classroom (BIITC).

Table 2: Interpretation of mean scores of variables

Variable	Mean	S.D.	Interpretation
Support	3.70	.96	Agree
Training	3.30	1.02	Uncertain
Resources	3.59	1.10	Agree
PU	3.70	1.44	Agree
PEOU	3.61	1.09	Agree
ATTI	3.68	1.29	Agree
Teacher Beliefs	3.49	1.03	Agree
Teacher Knowledge and Skills	3.56	.86	Agree
BIITC	3.57	1.43	Agree

Note: Interpretation scale is 4.21-5.00 = Strongly Agree, 3.41-4.20 = Agree, 2.61-3.40 = Uncertain, 1.81-2.60 = Disagree, 1.00-1.80 = Strongly Disagree

Regression analysis determined whether responses for BIITC were influenced by responses for External and Internal Barrier. In *Table 3*, only 18% of BIITC variance was due to External Barrier where only Support, just one of three barriers was significant. However in *Table 4*, 84% of BIITC variance was due to Internal Barrier, where Teacher Beliefs, only one of five barriers, was insignificant. In *Table 5*, the same set of barriers (PU, PEOU, ATTI, and Teacher Knowledge and Skills) under Internal Barrier remained significant, just as in *Table 4*, even after all barriers from both External and Internal Barrier were placed in regression analysis altogether accounting for 85% of BIITC variance. External barrier of Support lost its significance to Training, revealing inconsistency. The strongest and weakest predictor was consistent, which are PU and Teacher Knowledge and Skills, respectively.

Table 3: Regression Analysis Summary for the independent variable, External Barrier and dependent variable, BIITC

	Mean	SD	B	R
Support	3.70	.96	.41	.41*
Training	3.30	1.02	-.14	.23
Resources	3.59	1.10	.12	.39

*Note: R^2 = .18 (N = 105, *p < .05)*

Table 4: Regression Analysis Summary for the independent variable, Internal Barrier and dependent variable, BIITC

	Mean	SD	B	R
PU	3.70	1.44	.45	.88**
PEOU	3.61	1.09	.20	.77**

ATTI	3.68	1.29	.23	.86*
Teacher Beliefs	3.49	1.03	-.08	.77
Teacher Knowledge and Skills	3.56	.86	.21	.76**

Note: $R^2 = .84$ *(N = 105, *p < .05)*
***p<.01*

Table 5: Regression Analysis Summary for all independent variables and dependent variable, BIITC

	Mean	**SD**	**B**	**R**
Support	3.70	.96	.41	.41
Training	3.30	1.02	-.14	.23*
Resources	3.59	1.10	.12	.39
PU	3.70	1.44	.45	.88**
PEOU	3.61	1.09	.20	.77**
ATTI	3.68	1.29	.23	.86*
Teacher Beliefs	3.49	1.03	-.08	.77
Teacher Knowledge and Skills	3.56	.86	.21	.76**

Note: $R^2 = .85$ *(N = 105,* p < .05)*
***p<.01*

The finding is that Internal Barrier, and *not* External Barrier, influenced BIITC as shown from the regression statistics. The hypotheses rejected are:

H_{a1}: External Barrier consisting of Support, Training, and Resources has an influence on teachers' BIITC.

H_{02}: Internal Barrier consisting of PU, PEOU, ATTI, Teacher Beliefs, and Teacher Knowledge and Skills does not influence teachers' BIITC.

Answering research question 1, testing of hypothesis 1 revealed that External Barrier consisting of Support, Training, and Resources does not influence BIITC. Support's lone significance, however, cannot be entirely ignored in hindsight, as encouragement can empower teachers to improvise and therefore integrate technology even if training and resources are lacking. Thus, schools should not become complacent and allow themselves to lag behind on support, training, and providing resources for teachers as providing such would facilitate those teachers that believe in technology integration. Objectives must be created for plans that have to continue changing to sustain technology adaptation in schools (Lim, et al., 2013, p. 63; Teo, et al., 2015, p. 245). Teachers should have the chance to be heard in policy planning so that they can reflect on their experience and be part of the ongoing effort for successful technology integration (Lim et al., 2013, p. 65; Messina & Tabone, 2013, p. 12).

Answering research question 2, testing of hypothesis 2 indicated that Internal Barrier indeed influenced BIITC. This shows that as long as teachers feel that integrating technology is useful, easy, have a positive attitude and the knowledge and skills, they would have the intention to bring technology integration into their classrooms. To continually sustain technology integration, the school should exhibit Principals' Technological Leadership for their teachers to keep such internal barriers at bay and further lower them. This not only improves teachers' technological literacy and integration, but also teaching effectiveness, as the principal should no longer be a "building manager" but an "instructional and curricular leader" (Chang, 2012, p. 328). The school leadership is a critical part in the continued success of integration, (Lim et al., 2013, p. 66; Messina & Tabone, 2013, p. 11). In the United States and Taiwan for instance, the awareness is evident, as technology is now included in many leadership courses supported by their respective education departments (Chang, 2012).

5. CONCLUSION

The results of this research revealed that teachers did not face strong barriers to technology integration, while showing a moderate level of intention to integrate technology in the classroom. Thus, one cannot say that the barriers are towering high and curbing these teachers' intentions to integrate technology.

However, there was much more room to indicate a larger magnitude of agreement to the statements to represent that they are not facing the corresponding barriers, and the same goes for indicating intention to integrate, based on the means calculated. Thus, further support and demonstration of examples of the benefits of integration should be firmly encouraged and implemented as recommended so that such external and internal barriers remain lowered and ideally eliminated. As such, technology integration may continue in Thai-curriculum schools and intensify so that no further hindrances are added to Thai student achievement.

There are research limitations to be aware of. There may be other barriers that were inadvertently omitted of which could have changed the results. Some respondents may have had the incorrect understanding of technology integration principles, which could have affected the data. Lastly, respondents are prone to Halo Error, Leniency Error, and Recency Error when completing surveys. One must use discretion in applying these results as a larger sample could have introduced more demographic groups that could have shifted the data.

This research should prompt other researchers to determine the level of involvement teachers have in policy planning, and how much these teachers feel that their ideas matter, as this is crucial in maintaining technology integration in the classroom. There must be an investigation into how much technology integration training for school leadership is occurring, and whether it is proving to keep up technology integration and if not, what can be changed to improve this training. After all, there is currently no data on the quality and level of participation of schools in government-designed professional development courses (UNESCO, 2004). Quite simply, further research should be focused on the adequacy, development, and improvement of technology training courses and technological leadership courses. Education reform in Thailand could gain much more momentum with technology.

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