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Perspective of Thai CFL Teachers of ICT Application in Their Teaching: A case study of Chiang Rai Primary and Secondary Schools

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Abstract

This empirical study demonstrated the relationship of three beliefs: epistemological, pedagogical, and technological of Thai teachers in Chiang Rai, who teach Chinese as a foreign language. This study is mix-method research, including quantitative and qualitative research. The researchers implemented questionnaire of 128 cases were validated and analyzed using structural equation modeling (SEM). The results reveals that the teachers believe more on constructivism pedagogy which reflect on both pedagogical and technological beliefs whilst they reject the idea of innate ability and see that human's effort is important to overcome difficulty; however, they still believe in authority Knowledge and certain Knowledge which refer to the respect of master of knowledge. Based on the literature review, the researchers compared the findings of this research with other researches in Asian context. It implies that Thailand, Singapore and China teachers who work in the different social political environment, but underlying beliefs about the knowledge teaching and ICT intergraded education is shared. The qualitative study investigated 5 in-service teachers. Semi-structured interviews were applied for the qualitative data collection. Apart of the interviews, we have got 4 replies from online open ended questions. The findings from quantitative research were confirmed by a following qualitative research. The findings indicate that CFL teachers in Chiang Rai tend to use ICT in a mixing of traditional and constructivist approaches, but because of barriers they prefer traditional approach. These barriers are including education policy, ICT infrastructure and teachers' technological pedagogical content knowledge and online learning materials and tools.

Keywords: Epistemic beliefs, Pedagogical Beliefs, ICT Beliefs, SEM, CFL

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■ Introduction

Research shows the influence of teachers' beliefs towards their teaching practice (Abdelraheem, 2004; Richardson, 1996). Therefore, it is important to understand their beliefs to improve their teaching behaviors (Kane, Sandretto, & Heath, 2002; Wu, Palmer, & Field, 2011). Chinese language gains more focused recently because the economic driving. Learning Chinese as a secondary language has been popular in various countries e.g. Asian. Therefore, the teaching of Chinese as a foreign language (CFL) has become a big market and requires research to improve their proficiency (Singh, 2013). From the literature, we found there were studies in Asia including China, Hong Kong, Taiwan and Singapore relate to epistemological, Pedagogical and technological beliefs of teachers. Relationship among the three beliefs and the beliefs to contextual variable were identified including contextual variables include culture, political perspectives and etc. However, there were few research regarding the relationship of the three beliefs in Thailand specially in teaching Chinese. More studies are needed to explore if similar constructs would emerge from different context. The OECD and UNESCO (2016) suggest researchers that:

" ... Put in place a centralized system for periodic (annual or biannual) collection and publication of statistics, fed by school level data regarding infrastructure, equipment, training and use. Complement the gathering of statistics with evaluations (qualitative data) and continued participation in international surveys to enable a deeper understanding of the issues at hand and a comparative perspective on how Thailand is progressing of ICT."

In doing so, this empirical research aims to examine the relationships among Chiang Rai CFL teachers' epistemological beliefs, pedagogical beliefs and their preferred use of ICT to support and gain the deeper understanding about the CFL teachers' beliefs and toward to the use of ICT.

■ Literature Review

In this section, based on previous research by other authors it gives an overview of the three belief dimensions: Epistemology, Pedagogy, and Technology Use; how the relation between epistemological beliefs and pedagogical beliefs are; and how the two belief dimensions effect on technology use of the teachers including their use of technology in their teaching.

1. Teachers' epistemic beliefs

The epistemological beliefs concept refers to how people think of the nature of knowledge and learning, how people get to know and how knowledge is formed and evaluated (Hofer & Pintrich, 1997). Perry (Perry Jr, 1999) raises the idea of the four stages of epistemological developmental: dualistic, multiplistic, relativistic, and commitment with relativism. The model has been later adjusted by several authors. Schommer (Schommer, 1990) argues that the developmental model may not be able to express the complexity of epistemic beliefs because it is unidimensional nature. Later she suggests a multidimensional model in four independent beliefs: innate ability, quick learning, simple knowledge, and certain knowledge.

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In the concept of lifelong learning, epistemological thinking is an essential element; it determines how individuals learn both formal learning in school and informal learning in working place. Epistemology research reveals how individuals obtain, evaluate and utilize knowledge (King & Kitchener, 1994; Kuhn, 1991).

The models of Perry and Schommer are alternatively implemented by different authors in different contexts in order to evaluate teachers' epistemological beliefs. Several researchers adapted Schommer's model; Chan and Elliott (Chan & Elliott, 2004) investigated epistemological beliefs of Hong Kong pre-service teachers by using the 30-item survey; their results were different from Schommer's due to different culture.

Hofer (Hofer, 2008) proposes that these models should be tested in different cultures. Cheng, Chan, Tang and Cheng (Cheng, Chan, Tang, & Cheng, 2009) used the same questionnaire with interviews; they found similar findings of Hong Kong pre-service teachers. Chai and Khine (Sing & Khine, 2008) also adapted Chan and Elliott's approach to examine epistemological beliefs of Singaporean pre-service teachers; they found a similar pattern; they applied different background variables including teachers' program level, gender, major subjects, ethnicity, and their teaching experience. Later Chai, Deng, Wong and Qian (2010) employed the same approach to evaluate epistemological beliefs of South-China teacher education students. The findings from the same approach found similar pattern of their epistemological beliefs when compare teachers from Singapore, Hong Kong and South-China. Furthermore, Chai (Chai, 2010a) employed epistemological beliefs and pedagogical beliefs into a qualitative research to evaluate Singaporean teachers; the pedagogical beliefs was composed of two dimensions: constructivist and tradition. The results reveal relation between the two beliefs.

Studies of epistemological beliefs show that the epistemological beliefs of teachers affect their way of teaching (Chan & Elliott, 2004; Deng, Chai, Tsai, & Lee, 2014; Pajares, 1992; Sing & Khine, 2008; Wong, Chan, & Lai, 2009); therefore, it is necessary to investigate teachers' pedagogical beliefs as well which is discussed in the later section.

2. Teachers' pedagogical beliefs

Pedagogical beliefs refer to individuals' desirable approaches of learning and teaching including meaning and roles of both teachers and learners. Pedagogical beliefs can be divided into two main perspectives: teacher-centered and student-centered (Kember, 1997). Teacher-centred may be referred as traditional approach which means the teachers play a center role of learning and teaching activities; the activities focus on knowledge transmission from a master (teachers) to novices (learners) who act as passive listeners (Brooks & Brooks, 1999; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). By contrast, student-centred is an active learning; learning relies on self-inquiry of students; students learn by their own experience to explore or discover facts which leads to different levels of learning: remember, understanding, application, evaluation, and creation (Krathwohl, 2002). Thus, the student-centred is referred as constructivism (Brooks & Brooks, 1999; Chan & Elliott, 2004).

3. The relationship between teachers' epistemological beliefs and Teachers' pedagogical beliefs

The beliefs of how to teach and learn relates to how knowledge is acquired (Hofer & Pintrich, 1997). Individuals who believe knowledge is a set of facts, usually rely on traditional teaching and learning (Fang, 1996). By contrast, if individuals perceive knowledge is formed by constructing by students themselves usually rely on constructivism teaching approach (Maggioni & Parkinson, 2008). Therefore, pedagogical beliefs can be divided into two dimensions: traditional and constructivism pedagogical beliefs.

4. The relationship among epistemological beliefs, pedagogical beliefs and the preferred use of ICT

Teacher ICT use is an individual perspective of each teacher to employ ICT as tools into their everyday life; this includes infrastructure, devices, application and the users. Capacity of ICT can be different levels: basic operation, customization and creation. Not only technology use in their daily life but also in their teaching and to what extend they use the technology to enhance their classroom activities. ICT can be used as pedagogical tools to support teaching activities. A study by Ertmer (Ertmer, 2005) finds that the way teacher use technology influences the way technology is utilized in classroom. For example, teachers who hold traditional pedagogical beliefs trend to persuade students to use technology to enhance their memory and for knowledge transmission. In contrast, teachers who hold constructivist pedagogical belief tend to apply ICT to support students' knowledge construction processes (Brownlee, Purdie, & Boulton-Lewis, 2001). Chai found that in Singapore constructivist teachers tend to apply ICT to both traditionally and constructively (2010) (Chai, Deng, et al., 2010). He explains that the teachers may see the important of the two approaches knowledge transmission in traditional pedagogy is important to build a strong ground understanding before starting construct knowledge which requires a higher skill of learning. To understand epistemological, pedagogical, and technology-use beliefs of Chinese teachers, Deng et al. (Deng et al., 2014) conducted a survey and found that the teachers who rely on constructivism pedagogy which affect their use of technology. By contrast, technology is not in the favor of teachers who rely on traditional pedagogy.

Studies of the relations among epistemological, pedagogical and technology use had been conducted in Singapore, Taiwan, Turkey, and South-China as shown in Table 1.

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Table 1. Relation between epistemological, pedagogical beliefs to ICT use in teaching in other contexts

Context, year & source	Findings
Singapore and Taiwan pre-service teachers 2009 (Chai, Hong, & Teo, 2009)	-Teachers do not rely strongly on experts or authorities as the source of knowledge. -Teachers do not believe knowledge is certain and unchanging. -Teachers prefer constructivist teaching.
Singapore pre-service teachers 2010 (Chai, 2010a)	-General ICT competencies support the use of both constructively and traditionally use of ICT -Traditional teachers trend to use of ICT traditionally. -Constructivist teachers tend to use of ICT constructively.
Singapore pre-service teachers 2010 (Chai, Teo, & Lee, 2010)	-Innate ability relates positively to traditional teaching. -Learning effort and process relates positively to traditional teaching. -Learning effort and process relates positively to constructivist teaching.
Turkey pre-service teachers 2011 (Yilmaz & Sahin, 2011)	-Turkish teachers prefer constructivism teaching rather than traditional teaching.
China teachers 2014(Deng et al., 2014)	-Authority knowledge positively effects on traditional teaching. -Authority knowledge positively effects on constructivist teaching. -Authority knowledge positively effects on traditional use of ICT. -Certain knowledge positively effects on constructivist teaching. -Certain knowledge positively effects on constructivist use of ICT. -Constructivist teaching positively effects on constructivist use of ICT. -Constructivist teaching positively effects on traditional use of ICT.

However, these findings could be different in Thailand which does not have Chinese culture as their background comparing to Taiwan, Singapore, and Hong Kong. Therefore, we need to investigate the dimensions in Thailand.

This research is guided by the following research questions:

a) What are the Thai CFL teachers' epistemological beliefs?

b) What are the Thai CFL teachers' pedagogical beliefs?

c) What is the relationship between Thai CFL teachers' epistemological beliefs, pedagogical beliefs?

d) What is the relationship among epistemological beliefs, pedagogical beliefs and the preferred use of ICT?

e) How do the Thai CFL teachers use ICT for teaching and learning?

f) What are the barriers to integrate ICT into CFL teaching and learning?

■ Research design and participants

Punch (2009) mentioned that research design guide the researchers to seek answers to the research questions. Research plan consists of strategy; a conceptual framework; studied object; and instruments and process for data collecting and analyzing (Punch, 2009, p. 113). This empirical research is mixed method; it includes qualitative and quantitative study. (Punch, 2009, p. 357).

Phrase I is the quantitative research period, the paper-based questionnaires were distributed to CFL teachers (primary schools, junior high schools, senior high schools) in Chiang Rai by Secondary Education Service Office Chiang Rai. Questionnaires were distributed to them to rate their feeling of each items of the three beliefs based on 5-point-scale questions ranging from 1 (Strongly Disagree) and 5 (Strongly Agree). 132 questionnaires were collected and because of not-complete (evaluate by checking blank answers) and not reliable (standard deviation must over 1.00), 4 questionnaires were removed. Data was ready for analysis with 128 questionnaires. The average age of CFL teachers is 30 years old. The average working year is 5.1 years. 70.31% teachers are high school teachers.

In order to substantiate this analysis and verify the findings, the qualitative study is need. Phrase II is the qualitative research period, the researchers interviewed 5 teachers. 2 teachers are from primary schools, 3 teachers are from junior and senior high schools. Semi-structured interviews were applied for the qualitative data collection.

PHASE I: QUANTITATIVE RESEARCH

1. The research instruments

The questionnaire is including 3 sections. The Epistemological beliefs questionnaire (EBQ) and pedagogical beliefs questionnaire (PBQ) were adapted from Chan and Elliott (2004) and translated into Thai by two Thai language experts. The epistemological belief questionnaire (EBQ) is consists of 4 sub-scales with 30 items: Fixed ability (8 items); Learning effort (11 items); Authority knowledge (6 items); Certainty knowledge (5 items).

Innate/Fixed Ability is the ability from birth/unchangeable on one side scale and dynamic/ developable on another side scale.

Learning Effort/Process is the belief of working hard to archive a learning goal.

Authority/Expert Knowledge is the belief of acquiring knowledge whether it should be obtained by the learner themselves or transferred from an expert.

Certainty Knowledge is the belief of characteristics of knowledge whether it is unchangeable or dynamic (Chan & Elliott, 2004). The pedagogical beliefs questionnaire (PBQ) is developed to examine teachers' pedagogical beliefs with two sub-scales: traditional approach (18 items) and constructivist approach (12 items).

The ICT beliefs questionnaire (UIQ) is developed with two sub-scales. General ICT competencies (GIC) and pedagogical-oriented ICT competencies (PIC). TPACK

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(Technological Pedagogical Content Knowledge) framework (Koehler & Mishra, 2009) was utilized in the questionnaire.

The pedagogical-oriented ICT competencies with two subscales: traditional use of ICT (16 items) and Constructivist use of ICT (11 items). These questions were adapted in this study.

2. Research model and hypotheses

This study aims to study the Chiang Rai CFL teachers of their epistemological beliefs, pedagogical beliefs and use of ICT including the relationship among the beliefs towards their pedagogical beliefs. The hypotheses are:

H1: Innate ability has the positive effect on traditional pedagogical beliefs.

H2: Innate ability has the positive effect on constructivist pedagogical beliefs.

H3: Innate ability has the positive effect on traditional use of ICT.

H4: Innate ability has the positive effect on constructivist use of ICT.

H5: Learning effect has the positive effect on traditional pedagogical beliefs.

H6: Learning effect has the positive effect on constructivist pedagogical beliefs.

H7: Learning effect has the positive effect on traditional use of ICT.

H8: Learning effect has the positive effect on constructivist use of ICT.

H9: Authority knowledge has the positive effect on traditional pedagogical beliefs.

H10: Authority knowledge has the positive effect on constructivist pedagogical beliefs.

H11: Authority knowledge has the positive effect on traditional use of ICT.

H12: Authority knowledge has the positive effect on constructivist use of ICT.

H13: Certain knowledge has the positive effect on traditional pedagogical beliefs.

H14: Certain knowledge has the positive effect on constructivist pedagogical beliefs.

H15: Certain knowledge has the positive effect on traditional use of ICT.

H16: Certain knowledge has the positive effect on constructivist use of ICT.

H17: Traditional pedagogical beliefs have the positive effect on traditional use of ICT.

H18: Traditional pedagogical beliefs have the positive effect on constructivist use of ICT.

H19: Constructivist pedagogical beliefs have the positive effect on traditional use of ICT.

H20: Constructivist pedagogical beliefs have the positive effect on constructivist use of ICT.

3. Quantitative Data Analysis

The researchers test the model and hypotheses by using WrapPLS 6.0 software; the software is based on structural equation modeling (SEM) techniques. It allows researchers to assess the model parameters and structural path coefficients. The PLS software was applied in the study because it is better for complex models with many constructs and links (Ahuja, Chudoba, Kacmar, McKnight, & George, 2007; Pavlou & Fygenson, 2006). It is applied to test the hypotheses by examining the significance of the path coefficients.

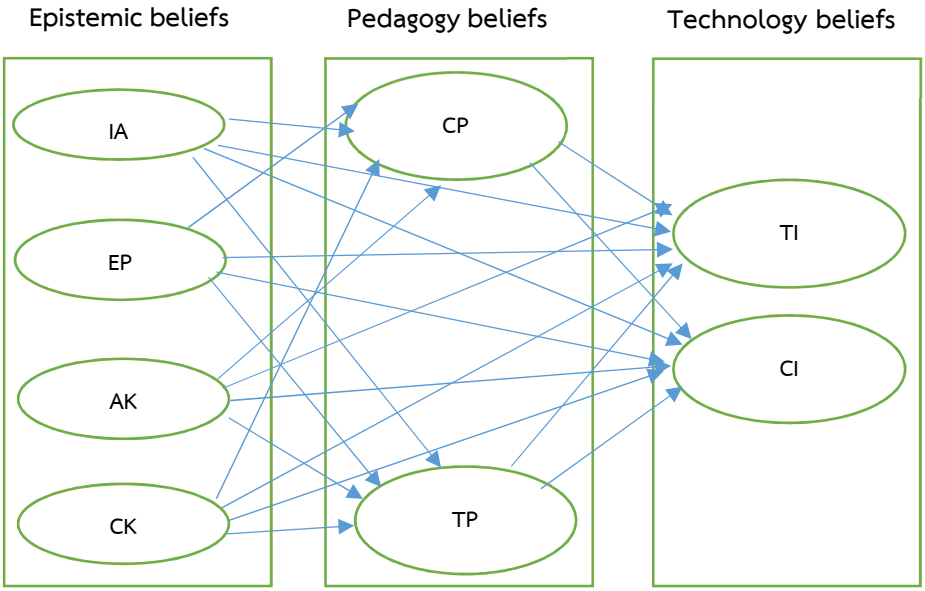

Figure1. The proposed research model

4. Reliability and Validity

Churchchill and Iacobucci (2005) proposed standard levels for measurement are loading factor 0.7, Cronbach's alphas 0.7, composite reliability 0.6, and the average variances extracted (AVE) 0.5. After the data was tested with the proposed model we found that the loading factors are higher than the standard level; AVE is higher, composite reliability are much higher than the standard levels. However, Cronbach's alpha of Innate Ability and Traditional Pedagogical Beliefs are at the standard level (0.693 and 0.675) whilst the other constructs' Cronbach's alpha are higher than the standard level. Table 2 shows the final values of reliability, validity and measurement invariance test. The reliability values are higher than the standard value; therefore, the reliability and convergent are qualified.

Table 2. Standardized loadings and reliability measures constructs

Construct	Mean	SD	Cronbach's alpha	AVE	Composite Reliability
1. Innate Ability(IA)	2.7	0.9	0.693	0.621	0.830
2. Learning Effort (EP)	4.3	0.7	0.839	0.677	0.893
3. Authority Knowledge (AK)	3.1	0.8	0.784	0.700	0.875
4. Certain Knowledge (CK)	4	0.7	0.762	0.584	0.849
5. Constructivism pedagogical beliefs(CP)	4.5	0.5	0.902	0.594	0.921
6. Traditional pedagogical beliefs(TP)	2.7	0.8	0.675	0.607	0.822
7. Traditional Use of ICT(TI)	3.7	0.7	0.845	0.618	0.890
8. Constructivism use of ICT(CI)	4.1	0.7	0.934	0.720	0.947

Fornell and Larcker (1981) suggested that the model is valid when all left ventricles are lower than its Square roots of average variances extracted. Table 3 shows correlations among left ventricles with Square roots of average variances extracted; all left ventricles are lower than its Square roots of average variances extracted which means each construct common variance with its own indicators when compare with the other constructs.

Table 3. Correlations among left ventricles with Square roots of average variances extracted

Construct	IA	EP	AK	CK	CP	TP	TI	CI
IA	0.788							
EP	0.179	0.823						
AK	0.204	0.167	0.837					
CK	0.027	0.562	0.170	0.764				
CP	0.078	0.506	0.091	0.475	0.771			
TP	0.125	0.110	0.37	-0.029	-0.067	0.779		
TI	-0.031	0.165	-0.017	0.265	0.314	0.012	0.786	
CI	-0.048	0.183	0.004	0.278	0.315	0.003	0.459	0.848

Note: Square roots of average variances extracted (AVEs) shown on diagonal.

Table 4 presents the factor structure matrix of the study variables. It demonstrates strong convergent and discriminant validity. The second part of convergent and discriminant reliability is showed in Table 4. which shows loadings and cross-loadings; They are all over 0.6 (Fornell & Larcker, 1981). The loading values above 0.6 show that they share more variance on its own construct when compare to the others.

Table 4. Normalized combined loadings and cross-loadings (Factor structure matrix)

Construct	IA	EP	AK	CK	CP	TP	TI	CI
IA1	0.977	-0.116	-0.101	0.065	0.066	0.055	-0.102	0.009
IA2	0.928	0.202	-0.025	-0.221	-0.187	-0.066	0.094	0.003
IA3	0.981	-0.052	0.117	0.117	0.088	0.001	0.022	-0.012
EP1	-0.017	0.992	-0.058	-0.011	-0.030	0.002	-0.102	0.016
EP2	-0.044	0.979	-0.102	-0.063	0.098	0.042	-0.116	-0.018
EP3	0.135	0.918	0.253	-0.012	0.003	0.102	0.209	-0.142
EP4	-0.056	0.959	-0.041	0.112	-0.086	-0.163	0.089	0.148
AK1	-0.001	0.101	0.978	0.073	-0.045	-0.128	-0.016	0.091
AK2	0.045	0.018	0.989	-0.138	-0.030	-0.001	-0.005	-0.002
AK3	-0.056	-0.140	0.962	0.093	0.091	0.150	0.026	-0.103
CK1	0.001	0.400	0.026	0.900	-0.059	-0.147	-0.018	0.065
CK2	0.013	-0.096	-0.009	0.978	-0.059	0.056	-0.101	0.131
CK3	0.070	-0.160	-0.094	0.966	0.127	-0.008	-0.109	0.007

Construct	IA	EP	AK	CK	CP	TP	TI	CI
CK4	-0.103	-0.050	0.102	0.919	-0.030	0.075	0.272	-0.226
CP1	-0.244	0.218	0.066	0.040	0.921	-0.027	-0.186	0.064
CP2	0.120	0.044	-0.128	0.188	0.955	0.133	-0.033	0.035
CP3	0.094	0.048	0.061	-0.079	0.963	-0.220	-0.028	-0.039
CP4	-0.029	-0.008	-0.088	-0.086	0.981	0.090	0.068	-0.095
CP5	-0.022	-0.097	-0.002	-0.239	0.961	0.083	0.039	-0.008
CP6	0.089	-0.130	-0.012	0.040	0.977	0.016	0.062	-0.125
CP7	0.004	-0.029	0.129	0.118	0.970	0.111	0.052	0.113
CP8	-0.045	-0.001	0.014	0.209	0.938	-0.208	-0.007	0.176
TP1	0.126	-0.211	0.009	0.497	-0.191	0.802	-0.107	-0.033
TP2	-0.164	0.255	-0.061	-0.177	0.002	0.932	0.069	-0.019
TP3	0.054	-0.070	0.057	-0.292	0.183	0.931	0.029	0.053
TI1	0.172	0.065	-0.063	-0.163	0.015	0.052	0.960	0.106
TI2	-0.203	0.184	-0.027	-0.090	0.100	0.089	0.948	0.003
TI3	0.044	-0.130	-0.109	0.028	0.060	0.191	0.951	-0.152
TI4	-0.086	0.014	0.189	-0.032	0.068	-0.225	0.941	0.124
TI5	0.077	-0.128	0.054	0.256	-0.253	-0.173	0.902	-0.040
CI1	0.019	-0.028	-0.030	-0.009	0.146	0.045	-0.063	0.985
CI2	-0.043	0.080	0.166	-0.234	-0.100	-0.177	0.211	0.908
CI3	-0.134	0.016	0.182	-0.176	-0.042	-0.220	0.245	0.899
CI4	0.025	-0.002	0.028	-0.040	-0.079	0.006	0.015	0.995
CI5	0.058	-0.046	-0.096	0.116	0.090	0.041	-0.165	0.967
CI6	0.000	-0.143	-0.127	0.151	0.068	0.098	-0.120	0.955
CI7	0.036	0.166	-0.052	0.116	-0.128	0.145	-0.020	0.958

Note: Loadings and cross-loadings shown are after oblique rotation and Kaiser Normalization.

5 .The Analysis processes

The researchers applied WarpPLS 6.0 to do factor analysis in this study. WarpPLS provides 5 steps for analysis Step1: Creating a project file, Step2: Read data file, Step3: Preprocess data, Step4: Define variable and model and Step5: Perform SEM analysis. However, Step4 and Step5 were performed back and forth to refine the model and number of items for each construct. Item which was has value lower than 0.7 was excluded. So the model extracted 37 items with 8 factors.

The 37 items are:

IA1. There isn’t much you can do to make yourself smarter as your ability is fixed at birth.

IA2. Our abilities to learn are fixed at birth.

IA3. One's innate ability limits what one can do.

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EP1. If people can't understand something right away, they should keep on trying.

EP2. Knowing how to learn is more important than the acquired facts.

EP3. One learns little if one does not work hard.

EP4. Understanding course materials and thinking process are more important than acquiring knowledge/facts.

AK1. Sometimes I don't believe the facts in textbooks written by authorities.

AK2. Even advice from experts should often be questioned.

AK3. I often wonder how much experts really know.

CK1. Scientists will ultimately get to the truth if they keep searching for it.

CK2. If scientists try hard enough; they can find the truth to almost anything.

CK3. Anyone can figure out difficult concepts if one works hard enough.

CK4. I believe there should exist a teaching method applicable to all learning situations.

CP1. It is important that a teacher understands the feelings of the students.

CP2. Good teachers always encourage students to think for answers themselves.

CP3. Learning means students have ample opportunities to explore, discuss and express their ideas.

CP4. In good classrooms there is a democratic and free atmosphere which stimulates students to think and interact.

CP5. Every child is unique or special and deserves an education tailored to his or her particular needs.

CP6. Effective teaching encourages more discussion and hands on activities for students.

CP7. The focus of teaching is to help students construct knowledge from their learning experience instead of knowledge communication.

CP8. Instruction should be flexible enough to accommodate individual differences among students.

TP1. Good teachers always make their students feel important.

TP2. A teacher's major task is to give students knowledge/information, assign them drill and practice, and test their recall.

TP3. During the lesson, it is important to keep Students confined to the textbooks and the desks.

TI1. I have the technical skills to use computers effectively.

TI2. I can learn technology easily.

TI3. I know how to solve my own technical problems when using technology.

TI4. I keep up with important new technologies.

TI5. I can to create web pages.

CI1. ICT can provide collaborative learning environment.

CI2. I prefer to use ICT to analyze information critically.

CI3. I can use ICT for basic learning activities in a classroom.

CI4. I can use computer supported collaborative learning systems.

CI5. A learner-centered environment could be created by using ICT.

CI6. ICT improves the quality of teaching.

CI7. ICT enables new ways of teaching.

The model included 37 items with 8 latent constructs. The measurement model test presented a good fit between the data and the proposed model. By using WarpPLS 6.0, ten global model fit and quality indices are tested and values are displayed below.

- Average path coefficient (APC) is 0.168 with P is 0.013.
- Average R-squared (ARS) is 0.265 with P value less than0.001
- Average adjusted R-squared (AARS) is 0.235 with P value less than 0.001
- Average block VIF (AVIF) is 1.451; it is acceptable if AVIF <= 5.
- Average full collinearity VIF (AFVIF) is 1.408; it is acceptable if AFVIF less than 5.
- Tenenhaus GoF (GoF) is 0.412 which is considered as a large size.
- Sympson's paradox ratio (SPR) is 0.850; it is acceptable if SPR >= 0.7.
- R-squared contribution ratio (RSCR) is 0.960; it is acceptable if RSCR >= 0.9.
- Statistical suppression ratio (SSR) is 0.950, it is acceptable if SSR >= 0.7.
- Nonlinear bivariate causality direction ratio (NLBCDR) is 0.875; it is acceptable if NLBCDR >= 0.7.

These entire global models fit and quality indices show that the model is fit. Details of each indicator are not discussed here; however, they can be found in WarpPLS 6.0 Manual (Koch, 2017).

6. Results

6.1 Epistemological beliefs, pedagogical beliefs, and beliefs of ICT use

The mean score of the dimension “Learning effort and process” is the highest (4.3), followed by “Certain knowledge” (4), “Authority knowledge”(3.1) and finally “Innate knowledge”(2.7).It implies that the teachers reject knowledge and ability is fixed at birth, they are positive about the ability of human in order to solve an unknown problems and improve themselves. Human can improve by working harder and keep persisting. The teachers’ perspectives of “certain knowledge” (mean 4) and “authority knowledge” (mean 3.1), the results indicate that the teachers still believe in curtain knowledge is dynamic and they rely on expert. The teachers have very strong believed in constructivist pedagogy (mean 4.5). The teachers are more believe the constructivist use of ICT (mean 4.1) than traditional use of ICT (mean 3.7).

6.2 The relationship among the epistemological beliefs, pedagogical beliefs and the beliefs of use ICT

The model included 37 items with 8 latent constructs. The measurement model test presented a good fit between the data and the proposed model.

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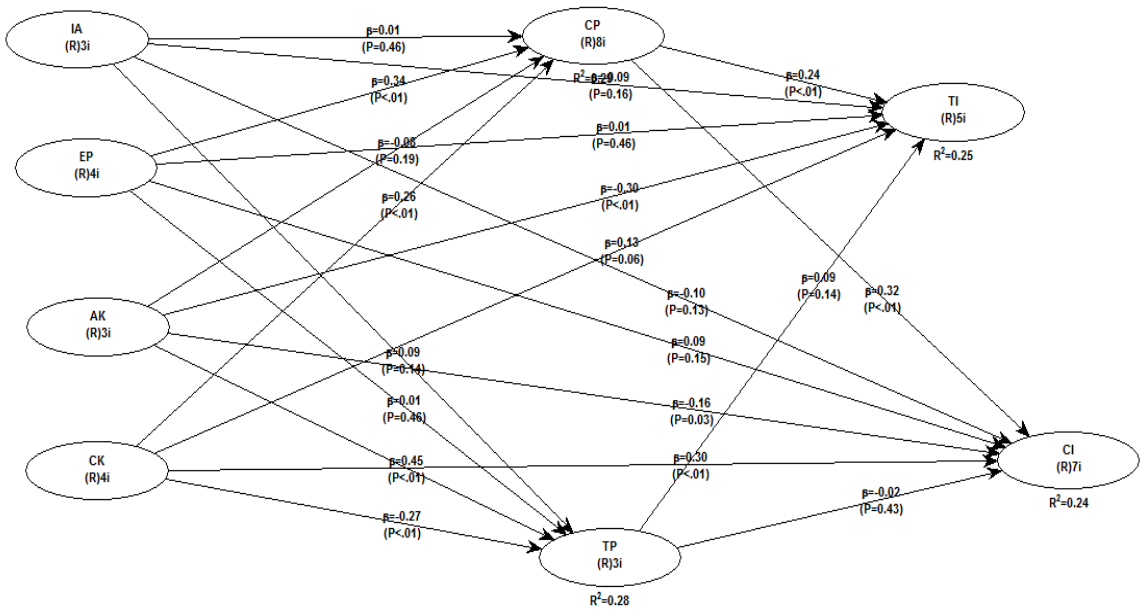

Figure 2. WarpPLS test of the proposed model.

Among the 20 hypothesis of the relationship among the epistemological beliefs, pedagogical beliefs and the beliefs of use ICT, only 8 were supported in the current study. They are as follows:

H6: Learning effort has the positive effect on constructivist pedagogical beliefs. (ß=0.34, P<0.01)

H9: Authority knowledge has the positive effect on traditional pedagogical beliefs. (ß=0.45, P<0.01)

H11: Authority knowledge has the positive effect on traditional use of ICT. (ß=0.30, P<0.01)

H13: Certain knowledge has the positive effect on traditional pedagogical beliefs. (ß=0.27, P<0.01)

H14: Certain knowledge has the positive effect on constructivist pedagogical beliefs. (ß=0.26, P<0.01)

H16: Certain knowledge has the positive effect on constructivist use of ICT. (ß=0.30, P<0.01)

H19: Constructivist pedagogical beliefs have the positive effect on traditional use of ICT. (ß=0.32, P<0.01)

H20: Constructivist pedagogical beliefs have the positive effect on constructivist use of ICT. (ß=0.24, P<0.01)

PHASE II: QUALITATIVE RESEARCH

1. Introduction of qualitative research

Phrase II is the qualitative research period; the main method is interview. Creswell describes qualitative research as:

“Begins with assumptions and the use of interpretive theoretical frameworks that inform the study of research problems addressing the meaning individuals or groups ascribe to a social or human problem. To study this problem, qualitative researchers use an emerging qualitative approach to inquiry, the collection of data in a natural setting sensitive to the people and places under study, and data analysis that is both inductive and deductive and establishes patterns or themes. The final written report or presentation includes the voices of participants, the reflexivity of the researcher, a complex description and

interpretation of the problem, and its contribution to the literature or a call for change." (Creswell, 2012, p. 44)

The researchers conducted qualitative research to follow up the quantitative research to confirm the findings of the quantitative research of the CFL teachers' epistemological beliefs, pedagogical beliefs, ICT beliefs and the relationship among the three beliefs in Chiang Rai Thailand.

In addition, the interview questions about their beliefs and practices of their use of ICT in their teaching were asked to extend the understanding.

2 Method and Data Processing

2.1 Participants, Data collection and analysis

Semi-structured interview was applied for the qualitative data collection.

The researchers interviewed 5 teachers from 5 schools in Chiang Rai. The interviews were recorded and summarized. Apart of the interviews, the researchers have got 4 replies from online open ended questions.

The qualitative data, including the interviews and online open-ended questions were in Thai. Before we analysis the data, two Thai-English language experts translated into English. The summarized interview along with online open-ended questions results were analyzed through a combination of the thematic analysis (Guest, MacQueen, & Namey, 2011, p. 10) and constant comparative methods (Strauss & Corbin, 1990).

2.2. Issues with validity and reliability

Validation and reliability in qualitative research can be seen as an attempt to assess the accuracy to the findings. Creswell (Creswell, 2012, pp. 249–250) mentions that in qualitative research is a time consuming activity but results in very thick and deep details of the findings which can enhance the accuracy of the study. That can be treated as "*a distinct strength of qualitative research*".

Creswell and Miller (Creswell & Miller, 2000) raised eight strategies for the validation strategies. They recommended that qualitative researchers should apply at least two of them in any study.

In this research, we applied two of the eight strategies:

First, Prolonged engagement and persistent observation. This strategy is to ensure the researchers understand the observant' behaviors and motivation by building trust and having long interaction with the observant. The researchers have known these CFL teachers since 2016 in the workshop of ICT support Chinese teaching and learning in Mae Fah Luang University. At that time the researchers have started built trust with these teachers. The researchers conducted a pilot research with these teachers. These teachers know our research purposes and questions well. We started visited the interviewees frequently and observed their teaching and learning for collecting the data from July 2017 until March 2018.

Second, member checking. This approach allows "*the researchers solicit participants' views of creditability of the findings and interpretation.*" The data analysis, description and findings of this research have been sent back to these CFL teachers to read and check.

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Note that, the results of the qualitative research was discussed in another paper differently. Therefore, the quotation of each assertation can be found on another paper (Yuan, Rongbutsri, and Aasavatheputhai 2018).

3. Findings and Conclusion

Assertion 1: Their epistemological beliefs support constructivism approach

All of the teachers do not believe in innate abilities. All of the teachers do not believe knowledge is certain and unchangeable. All believe that students can develop their knowledge and skills well by efforts. All do not totally believe the experts. They argued with the textbooks editors about the mistakes of the content, the contents and exercises of the book. Lin who from a high school said that he found some content is quite out of date. He mentioned that the content supposed to catch up with the change of the Chinese society. For example, the textbook should add 新四大发明（The new four innovation of China). Some content is conflict with Thai culture. For example, in the textbook 喝啤酒 **(** drink beer）. Teachers found that some exercise is quite difficult for Thai students because it focuses on students' linguistics knowledge, but not language skills.

***Assertion 2*: Traditional teaching dominates practice, whilst they believe in a better approach**

Teachers believe the constructivist pedagogy. But they report because of the limit teaching hours, the amount of lessons, the students' readiness and the school policy, they cannot apply the approach, they fall into the traditional way of teaching.

***Assertion 3:* ICT is mostly used for students' motivation and knowledge transmission**

All the interviewed teachers think ICT is a powerful tool for Chinese teaching and learning. However, they mainly use PowerPoint for instruction. They sometimes play videos from YouTube (a famous video streaming provider) for motivating students. There are less class activities for constructivist learning and teaching; however, they sought for a better way to stimulate more interaction with students. Some of them have experience of constructive learning activity but because of lacking experience of the activity management the activity was concluded as a time consuming and less focused activity, they eliminated it.

***Assertion 4:* School policies are the main barrier of ICT integration.**

Some teacher report discontinues of school principal making ICT support policy changes, so it is difficult to implement even the teachers want to do it. They sometimes apply sponsorship from other organization e.g. Confucius Institute for better ICT equipment. Whilst, another school is very supportive for ICT implementation e.g. free WIFI provided, projectors in every classroom, students are encouraged to use mobile phones for learning in the class.

To summarize, the qualitative results confirms the quantitative results. The teacher aware of the existing of a more fruitful educational model – constructivist comparing to traditional one which they practice currently. The change requires more encouraging and empowerment to the teachers.

The qualitative results show teachers prefer to use ICT and they are positive about blended learning model which combining the face-to-face interaction with online interaction. However, there are not enough encouragement they still rely on their traditional way of using ICT, Power Point for knowledge construction and Youtube video presentation for class motivation.

To be ready for ICT implementation in classroom, It is important for the educators to arrange the workshop for training teachers' technological pedagogical and content knowledge. The educators need to empower teachers combine ICT for the constructivist instruction. For example, the educators may design some eLearning for the teachers to teach Chinese efficiently and effectively. The teachers teach the students use digital dictionary to write compositions. The teachers may use digital storytelling tools to promote the students learn Chinese language.

The policy makers and school leaders supposed to offer the better environment for the teachers. Educators and researchers should work together to improve ICT integrated teaching and learning Chinese successfully. For future research, it is important for researchers to identify teachers TPACK (a framework for preparing teaching to implement ICT in their classroom) needs to design the training course. Case studies and longitude research is important to examine the change of CFL teachers' beliefs and practice in Thailand. Finally, the 21st century skills requires students to master the life-long learning skills and IT literacy, the Thai students' learning psychology and behavior by ICT supposed to be considered and studied.

■ Discussion and Conclusion

The results of the quantitative study demonstrated that the systemic relationship among the Chiang Rai CFL teachers' epistemological beliefs, pedagogical beliefs and their beliefs of use ICT. For the epistemological beliefs, the Chiang Rai CFL teachers is compared with Hong Kong teachers and Singapore teachers, all of the teachers are inclined to beliefs of "learning effort and process", but negative to "Innate knowledge". All of the teachers think "certain knowledge" and "authority knowledge" is reliable and important. For the pedagogical beliefs, the Chiang Rai CFL teachers have stronger believed in constructivist pedagogy (mean 4.5) than teachers from Hong Kong, Singapore and China.

For beliefs of ICT use, the Chiang Rai CFL teachers are more believe the constructivist use of ICT (mean 4.1) than traditional use of ICT(mean 3.7). The finding is same as teachers from China.

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Table 5. Comparing of descriptive analysis of latent variables of this study with Chai's study and Wong's study

Construct	This study		China 2013 (Deng et al., 2014)		Singapore 2010 (Chai, Teo, et al., 2010)		Hong Kong2009 (Wong et al., 2009)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
IA	2.7	0.9			2.33	0.69	2.73	0.55
EP	4.3	0.7			4.18	0.51	3.83	0.54
AK	3.1	0.8	2.00	0.85	3.46	0.61	2.63	0.5
CK	4	0.7	3.15	1.06	3.12	0.72	2.79	0.55
CP	4.5	0.5	4.24	0.86				
TP	2.7	0.8	2.31	0.78				
TI	3.7	0.7	2.90	0.97				
CI	4.1	0.7	3.89	0.78				

Based on the findings for the hypotheses, teachers who are more believed in authority knowledge (mean 3.1) are inclined to believe in both traditional pedagogical beliefs and traditional use of ICT. The findings are same as Deng (Deng et al., 2014) assessed the beliefs of Chinese teachers, but opposite as Singaporean teachers (Chai, 2010a). Teachers who believe more Learning effort process (mean 4.3) are inclined towards constructivist pedagogy not traditional pedagogy. The finding is same as Chai (Chai, 2010a) assessed the beliefs of Singaporean teachers. Teachers who believe the certain knowledge (mean 4) are inclined to traditional pedagogical beliefs, constructivist pedagogical beliefs and constructivist use of ICT. But the China teachers who believe the certain knowledge are inclined to the constructivist pedagogy and constructivist use of ICT (Deng et al., 2014). The survey of Thailand teachers is inclined to subscribe to constructivist pedagogical beliefs (mean 4.5) rather than traditional pedagogical beliefs (mean 2.7). This result shows that like most of the studies conducted in Asia (Chai, 2010b; Chan & Elliott, 2004; Deng et al., 2014; Sang, Valcke, Van Braak, & Tondeur, 2010). The relationships between pedagogical beliefs and the views of ICT use can be supported by the obtained path coefficients. Constructivist teachers tends to apply both traditional use of ICT and constructivist use of ICT. This findings are similar to Deng (Deng et al., 2014), Chai (Chai, 2010b), Teo, Chai, Hung&Lee, (Teo, Chai, Hung, & Lee, 2008), Hermans,et,al. (Hermans, Tondeur, van Braak, & Valcke, 2008) and Tubin (Tubin, 2006).

Traditional pedagogical beliefs in this study are not significant related to any way of use ICT. Other studies aslo reported negative or no relations between traditional pedagogical beliefs and the use of ICT (Deng et al., 2014; Hermans et al., 2008; Teo et al., 2008). While, some studies reported there is a significant relation between traditional pedagogical beliefs and traditional use of ICT. It implies that Thailand, Singapore and China teachers who work in the different social political environment, but underlying beliefs about the

knowledge teaching and ICT intergraded education is shared. That can be interpreted Asian culture and beliefs about the knowledge, teaching and learning, the ICT use.

The qualitative findings provided support to the quantitative results. Interviewing CFL teachers was conducted and analyzed. They hold on dynamic beliefs about knowledge but keep practice their knowledge transmission (traditional approach) because of lacking the readiness of students, teachers, tools, infrastructures and policy. They need more encouragement and support. They prefer ICT implementation into their classrooms and aware of their potential. However, the way they use them is mainly for knowledge transmission and classroom motivation.

The educators need to empower teachers combine ICT for the constructivist instruction. For example, the educators may design some eLearning for the teachers to teach Chinese efficiently and effectively. The teachers may teach the students use digital dictionary to write compositions. The teachers may use digital storytelling tools to promote and support the students learn Chinese language.

Finally, the educators and government may rethink about the policy of ICT for the schools, while the financial and technological supports also need to be considered. The policy makers and school leaders supposed to offer the better environment for the teachers. Educators and researchers should work together to improve ICT integrated teaching and learning Chinese successfully.

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