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## Kindergarten Teachers' Information Technology Teaching Beliefs: The Critical Path Toward Teaching Effectiveness

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### Abstract

With the advanced information technology application, in education area, computer-assisted instruction has been transferred to the diverse usage of information technology. The research of kindergarten teachers' teaching belief in the usage of Information Technology and its impact on teaching effectiveness is the aim of the study. With random sampling to distribute and collect questionnaires, 512 kindergarten teachers in Northern Taiwan are selected as the research subjects. With SPSS, Factor Analysis, Regression Analysis, and Hierarchical Regression Analysis are utilized for data analyses. The research outcomes are concluded as follows. 1. Teaching Belief presents partially significantly positive correlations with Teaching Effectiveness. 2. Information Technology appears partially remarkably positive correlations with Teaching Belief. 3. Information Technology reveals partially notably positive correlations with Teaching Effectiveness. 4. Information Technology shows partially significantly moderating effects between Teaching Belief and Teaching Effectiveness. Based on the research outcomes, it is expected to provide some suggestions and reference for kindergartens with Information Technology integrating early childhood education.

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*Key words:* Teaching Beliefs, Teaching Effectiveness, Information Technology, early childhood education;

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### 1. Introduction

With the advanced progress of Information Technology and websites nowadays, its impact on life convenience, teaching and learning innovation is far beyond our thinking (Wang, 2009; Yeh, Chang, & Chang, 2011). With the Developmentally Appropriate Practice (DAP) in NAEYC, teaching has a lot of to do with promoting young children's optimal development and learning in effective way (Dina & Candace, 2009 ; Howard, Amanda, & Craig, 2010; Jie-Q & Charles, 2006; Wood, 2005).. In this knowledge-economy era, the cultivation of teachers' teaching belief in early childhood education undoubtedly plays key factor influencing teaching effectiveness and children's learning (Chou, 2012b; Lee, 2009; Liao, 2010; Liu, 2010; Sadik, 2008; Yost, 2002). Education is regarded as the foundation of a nation that the cultivation of excellent citizens could enhance the national competitiveness. Many research (Ale & Chib, 2011; Chiu, 2006; Chiu, 2008; Chiu and Chang, 2004; Chou, 2012a; Lin, 2005) suggested that from information technology perspective, early childhood educators' success in teaching belief plays a critical role

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on teaching, as their values or beliefs would be reflected on the instructions and further present direct and profound effects on children's learning (Tien & Hung 2011). For this reason, teachers' performance could significantly affect the success of education. Teaching Effectiveness is utilized for evaluating teachers' instructional performance. Teachers with high Teaching Effectiveness tend to affirm their job and well apply various instructional strategies to achieve the instructional objectives. In recent years, the research on Information technology integrated into early childhood instructions has been emphasized. In accordance with Chou (2012b), Information Technology Integrated Instructions refers to integrating Information technology into curriculum, materials, and instructions, where the integrated applications of Information technology and the learning field allow Information technology to be the inevitable teaching and learning tools for early childhood educators. With the close interrelationship between young children and Information Technology Integrated into curriculum, this study aims to extend Chou (2012b) studies on the effects of Southern Taiwan preschool teachers' teaching belief on teaching effectiveness from the Information Technology aspects, and then further to investigate the relationship between the effects of kindergarten teachers' teaching belief and their teaching effectiveness in Northern Taiwan.

## **2. Literature review**

### **2.1 Teaching Belief**

A lot of research (Chang, 2006; Chiu, 2004; Chiu, 2006; Chiu, 2008; Ho, 2002) emphasized on teachers' instructional behaviors has turned from the instructional process into the hidden factors in teachers' teaching decisions. With the extension of teaching behaviors, a lot of feedback is generated that teachers would adjust and modify the teaching behaviors with such information so as to achieve the educational objectives (Chang, 2010; Chiu, 2008; Lin, 2009; Wang, 2007). Teaching Belief presents the character of intra and inter-trust that it is generally explained as a psychological intention of teachers believing in factors in the teaching process (Deemer, 2004; Lin, 2009; Liu, 2010). Wu (2009) divided Teaching Belief into Student Center, Teacher Center, and Cooperation, in which, Student Center focused on children's active learning and teachers not actively interfering; Teacher Center indicated that teachers were the leader of learning, while students were the passive knowledge receivers; and, Cooperation emphasized the constant interactions between teachers and children to achieve the effective learning.

### **2.2 Teaching Effectiveness**

Research on Teaching Effectiveness has tended towards teachers' self-efficacy and effective instructions. The former was the subjective idea of teachers who believed in the instructions appearing effects on childhood learning. In other words, teachers subjectively affirmed the instructional professions and considered themselves presenting positive effects on childhood learning (Bandura, 1997). The latter referred to teachers developing their professions, achieving the teaching objectives, and enhancing the learning effectiveness with various teaching behaviors (Eradio, 2003; Lin, 2001; Yost, 2002). Teachers' Teaching Effectiveness could also be explained as teachers' actions with a series of strategies to achieve the present educational objectives (Kuo, 2009; Chien, 2009). Yang (2010) defined Teaching Effectiveness as teachers being able to arrange suitable teaching activities, provide good instructional environments, present systematical instructional contents, effectively utilize instructional skills, and build harmonious classroom atmosphere in the teaching process. This study applies the dimensions of Instructional Cooperation, Assessment, and Classroom Management proposed by Huang (2010) for Teaching Effectiveness, where Instructional Interaction refers to building favorable learning atmosphere, such as teachers' enthusiasm and teaching atmosphere, Assessment refers to the evaluation in the instructional process, such as criticism and feedback, and Classroom Management indicates the learning habits and the establishment of daily regular rules for children. For Assessment puts too much emphasis on products and outcome-orientation, the factor of Interpersonal Relationship emphasizing more on children's interaction during the learning process are applied to replace Assessment factor.

### **2.3 Information technology Integrated Instructions**

For kindergarten teachers, Information Technology Integrated Instructions focus on the interaction between teaching and learning process, rather than merely the teaching (Wang, 2009). The dimensions for Information Technology proposed by Peggy (2005) and Lee (2009) are utilized in this study.

1. Situational Setting. The purpose of information technology corner was to prepare an creative learning environment for young children so that they could operate it by themselves, and find and revise the mistakes on their own to complete the objective of self-learning.
2. Software and Hardware Selection. In kindergarten curriculum, the issue of selecting suitable software, the age, interests, operation ability, and instructional meanings should be taken into account. Open creation software should be chosen as the learning tool for children.
3. Teacher scaffolding. In topic instructions, teachers played the roles of planner and administrator, who actively arranged appropriate time and methods for Information Technology Integrated Instructions, such as how to precede the computer corner in the classroom and selecting suitable software for the operations of children.

#### 2.4 Research on Teaching Belief, Information Technology, and Teaching Effectiveness

Many researches emphasized on young children's learning with Information Technology. (Burriss & Wright, 2001; Cesarone, 2003; Clements & Sarama, 2003; Finegan & Austin, 2002; Gimbert & Cristol, 2004; Hartle, 2006; Helene & Paula, 2009; Linda, 2005; Scoter, Ellis, & Railsback, 2001). In the research on Teaching Belief and Teaching Effectiveness, Chang (2010) discovered that teachers with active teaching beliefs would outperform the others with general teaching effectiveness belief on information technology instructions; both Liao (2010) and Wang (2009) found the positive relations between Teaching Belief and Teaching Effectiveness of Information Technology; Feng (2009) pinpointed positive relations between Teaching Belief and Teaching Effectiveness; Su (2010) indicated the significant positive correlations between Information Technology integrated Teaching Belief and Teaching Effectiveness.

According to the research purpose and literature review, the hypotheses are as follows.

Hypothesis 1. Teaching Beliefs presents significantly positive correlations with Teaching Effectiveness.

Hypothesis 2. Information Technology appears significantly positive correlations with Teaching Beliefs.

Hypothesis 3. Information Technology reveals significantly positive correlations with Teaching Effectiveness.

Hypothesis 4. Information Technology shows significant moderating effects between Teaching Beliefs and Teaching Effectiveness.

### 3. Research method

#### 3.1 Research Framework

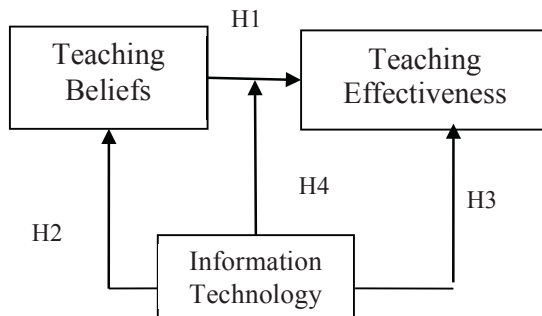


Fig. 3-1 Research framework

#### 3.2 Research samples

With random sampling to distribute and collect questionnaires on-site, kindergarten teachers in Northern Taiwan were selected as the research subjects. Within the total 512 questionnaires, 466 copies were collected. Having deducted 34 invalid ones, total 432 valid copies were retrieved.

3.2.1 Measurement of variables

The dimensions of Teaching Belief, Teaching Effectiveness, and Information Technology were 1. Teaching Belief was referred to Wu (2009) and revised as Student Center, Teacher Center, and Cooperation. 2. Teaching Effectiveness was referred to Huang (2010) and revised as Instructional Interaction, Interpersonal Relationship, and Classroom Management. 3. Information Technology, Lee (2009), covering Situational Setting, Software and Hardware selection, and Teacher scaffolding. In addition to the questionnaire, the interviews after the 512 questionnaires for randomly choosing 10 teachers from Northern Taiwan kindergarten teachers are also implemented in the study.

4. Research outcomes

4.1 Analyses of reliability and validity

4.1.1 Teaching Belief Scale

With Factor Analysis, three factors were abstracted for Teaching Beliefs Scale, namely Student Center (eigenvalue=2.268,  $\alpha=0.91$ ), Teacher Center (eigenvalue=1.772,  $\alpha=0.76$ ), and Cooperation (eigenvalue=1.537,  $\alpha=0.86$ ). The commonly accumulated variance explained achieved 78.186%.

4.1.2 Teaching Effectiveness Scale

With Factor Analysis, three factors were abstracted for Teaching Effectiveness Scale, including Instructional Interaction (eigenvalue=3.294,  $\alpha=0.79$ ), Interpersonal Relationship (eigenvalue=2.651,  $\alpha=0.75$ ), and Classroom Management (eigenvalue=2.013,  $\alpha=0.78$ ). The accumulated variance explained reached 79.364%.

4.1.3 Information Technology Scale

With Factor Analysis, three factors were abstracted for Information Technology Scale, containing Situational Setting (eigenvalue=2.320,  $\alpha=0.76$ ), Software and Hardware selection (eigenvalue=2.219,  $\alpha=0.87$ ), and Teacher scaffolding (eigenvalue=1.536,  $\alpha=0.79$ ). The commonly accumulated variance explained was up to 78.512%.

4.2 Regression between variables

In terms of Multiple Regression Analysis between Teaching Beliefs and Teaching Effectiveness, Student Center, Teacher Center, and Cooperation in Teaching Beliefs were the independent variables, while Instructional Interaction, Interpersonal Relationship, and Classroom Management in Teaching Effectiveness were the dependent variables.

Table 1: Multiple Regression Analysis between Teaching Beliefs and Teaching Effectiveness

		Teaching Beliefs (Independent variable)		
		Student Center	Teacher Center	Cooperation
Teaching Effectiveness (Dependent variable)	Instructional Interaction	0.102	0.177*	0.155*
	Interpersonal Relationship	0.052	0.111	0.165*
	Classroom Management	0.199**	0.158*	0.214**
F		6.591	7.137	8.219
Significance		0.000***	0.000***	0.000***
R <sup>2</sup>		0.269	0.358	0.417
Regulated R <sup>2</sup>		0.022	0.037	0.041
*p < 0.05 **p < 0.01 ***p < 0.001				

Data source: Self-organized in this study

After Multiple Regression Analysis between Teaching Belief and Teaching Effectiveness, Table 1, Student Center, Teacher Center, and Cooperation presented partially significant correlations with Interaction, Assessment, and Classroom Management that H1 was partially agreed.

Table 2: Multiple Regression Analysis between Information Technology and Teaching Beliefs

		Information Technology (Independent variable)		
		Situational Setting	Software and Hardware selection	Teacher scaffolding
Teaching Beliefs (Dependent variable)	Student Center	0.159*	0.177*	0.187*
	Teacher Center	0.179*	0.166*	0.179*
	Cooperation	0.121	0.197**	0.241**
	F	7.711	8.231	8.978
Significance		0.000***	0.000***	0.000***
R <sup>2</sup>		0.298	0.311	0.334
Regulated R <sup>2</sup>		0.031	0.049	0.059
*p < 0.05 **p < 0.01 ***p < 0.001				

Data source: Self-organized in this study

After Multiple Regression Analysis between Information Technology and Teaching Beliefs, Table 2, Situational Setting, Software and Hardware selection, and Teacher scaffolding appeared partially remarkably positive correlations with Student Center, Teacher Center, and Cooperation that H2 was partially agreed.

Table 3: Multiple Regression Analysis between Information Technology and Teaching Effectiveness

		Information Technology (Independent variable)		
		Situational Setting	Software and Hardware Selection	Teacher Scaffolding
Teaching Effectiveness (Dependent variable)	Instructional Interaction	0.159*	0.134*	0.158*
	Interpersonal Relationship	0.179*	0.157*	0.123
	Classroom Management	0.195**	0.219**	0.228**
F		8.996	10.715	12.382
Significance		0.000***	0.000***	0.000***
R <sup>2</sup>		0.191	0.197	0.378
Regulated R <sup>2</sup>		0.038	0.047	0.057
*p < 0.05 **p < 0.01 ***p < 0.001				

Data source: Self-organized in this study

After Multiple Regression Analysis between Information Technology and Teaching Effectiveness, Situational Setting, Software and Hardware Selection, and Teacher Scaffolding showed partially notable correlations with Instructional Interaction, Interpersonal Relationship, and Classroom Management that H3 was partially agreed.

#### 4.3 Hierarchical regression between variables

With Hierarchical Regression Analysis, the effects of the interactions between Teaching Beliefs and Information Technology on Teaching Effectiveness were discussed.

##### 4.3.1 Moderating effects of Teaching Belief and Information Technology on Instructional Interaction in Teaching Effectiveness

Having interactions between Student Center, Teacher Center, Cooperation and Situational Setting, Software and Hardware selection, Teacher Scaffolding, the effects on Instructional Interaction express Teaching Beliefs could explain 25.7% variance of Interaction before inputting Information Technology. The overall test of Multiple Linear Regression  $F=6.125$  ( $p < 0.001$ ) achieved the significance, showing the outstanding effects of Teaching Beliefs on Instructional Interaction. The regression coefficient of Cooperation ( $\beta=0.193$ ) achieved the significance and was positive; Cooperation therefore appeared notably positive effects on Interaction.

After inputting Information Technology into the regression model, the overall variance explained increased 2.1% and  $F=7.329$  ( $p < 0.001$ ) reached the significance. Overall speaking, both Teaching Beliefs and Information Technology revealed remarkably positive effects on Instructional Interaction. The variance explained was 27.4%, increasing obviously. Before inputting Information Technology, Student Center and Teacher Center did not present significantly positive effects on Teaching Beliefs. However, Student Center, Teacher Center, and Cooperation appeared remarkably positive effects on Instructional Interaction ( $\beta = 0.148$ ,  $p < 0.05$ ;  $\beta = 0.158$ ,  $p < 0.05$ ;  $\beta = 0.219$ ,  $p < 0.01$ ) with the moderating effect of Information Technology, and the effect strength increased. After inputting the interactions between Teaching Belief and Information Technology, the overall variance explained was increased and  $F=8.041$  ( $p < 0.001$ ) reached the significance, showing the outstanding effects on Instructional Interaction. With the moderating effects between Teaching Beliefs and Information Technology, Student Center and Software and Hardware selection, Cooperation and Software and Hardware selection, and Teacher Center and Teacher scaffolding revealed notably positive effects on Instructional Interaction. H4 therefore was agreed.

##### 4.3.2 Moderating effects of Teaching Belief and Information Technology on Interpersonal Relationship in Teaching Effectiveness

The effects between Student Center, Teacher Center, and Cooperation in Teaching Beliefs and Situational Setting, Software and Hardware selection, and Teacher scaffolding in Information Technology on Interpersonal Relationship express that Teaching Belief could explain 31.9% variance of Interaction before inputting Information Technology. The overall test of Multiple Linear Regression  $F=7.121$  ( $p < 0.001$ ) achieved the significance that Teaching Belief appeared notable effects on Interpersonal Relationship. The standardized regression coefficient  $\beta$  of Student Center and Cooperation appeared 0.159 and 0.143 ( $p < 0.05$ ), respectively. Both of them achieved the significance and were positive that the two independent variables showed remarkably positive effects on Interpersonal Relationship. After inputting Information Technology into the regression model, the overall variance explained increased 3.2% and  $F=8.401$  ( $p < 0.001$ ) reached the significance. In general, both Teaching Beliefs and Information Technology presented significantly positive effects on Interpersonal Relationship, and the variance explained was 32.8%, increasing obviously. After inputting Information Technology, Student Center and Cooperation appeared remarkably positive effects ( $\beta = 0.178$ ,  $p < 0.05$ ;  $\beta = 0.167$ ,  $p < 0.05$ ) on Interaction with the moderating effect of Information Technology. When inputting the Interaction between Teaching Beliefs and Information Technology, the overall variance explained was increased, and  $F= 10.192$  ( $p < 0.001$ ) achieved the significance that the two variables presented outstanding effects on Interpersonal Relationship. With the moderating effects between Teaching Beliefs and Information Technology, Teacher Center and Situational Setting, Student Center and Software and Hardware selection, and Cooperation and Teacher Scaffolding appeared notably positive effects on Interpersonal Relationship. H4-2 therefore was partially agreed.

##### 4.3.3. Moderating effects of Teaching Belief and Information Technology on Classroom Management in Teaching Effectiveness

With the interactions between Teaching Beliefs and Information Technology, the effects on Classroom Management in Teaching Effectiveness express that Teaching Beliefs could explain 39.8% variance of Interaction before inputting Information Technology. The overall test of Multiple Linear Regression  $F=8.421$  ( $p < 0.001$ )



achieved the significance that Teaching Beliefs revealed remarkable effects on Classroom Management. The standardized regression coefficient of Student Center, Teacher Center, and Cooperation appeared the significance,  $\beta=0.168$  ( $p < 0.05$ ),  $0.143$  ( $p < 0.05$ ), and  $0.212$  ( $p < 0.01$ ), reaching the significance and were positive. The three independent variables therefore revealed significantly positive effects on Classroom Management.

After inputting Information Technology to the regression model, the overall variance explained increased 2.2%, and  $F=11.156$  ( $p < 0.001$ ) reached the significance. After inputting Information Technology, Student Center, Teacher Center, and Cooperation revealed remarkably positive effects ( $\beta = 0.177$ ,  $p < 0.05$ ;  $\beta = 0.154$ ,  $p < 0.05$ ;  $\beta = 0.201$ ,  $p < 0.01$ ) on Classroom Management with the moderating effect of Information Technology, and the effect was increasing.

After inputting the Interaction between Teaching Beliefs and Information Technology, the overall variance explained was enhanced, and  $F=14.692$  ( $p < 0.001$ ) reached the significance. Having the moderating effects between Teaching Beliefs and Information Technology, Student Center and Situational Setting, Teacher Center and Software and Hardware selection, and Cooperation and Teacher Scaffolding revealed significantly positive effects on Classroom Management. H4-3 therefore was partially agreed.

## 5. Conclusions and suggestions

- 5.1 Teaching Materials and Curriculum Design: With the diverse performance in Information Technology tools, kindergarten teachers do believe that the tools and materials need to be criteria by professional educators. Information Technology performance has to be selected by kindergarten teachers for appropriate early childhood education demands. Take the diverse and creative pictures for example. They are so colored and easily motivate children's interests, without teachers' appropriate applying into the storytelling activities, the young children are so easy to be confused and focused on the appearing function of technology. If the young children don't realize why they need to learn and how to learn, they are easy to be influenced by negative sides from Information Technology, and it is also the topic all parents concern. Furthermore, teachers' well-being interaction with the young children plays a significant role in brings young children's amazing learning effectiveness. With the warm and happy going on atmosphere in the classroom, the children could have a lot of fun in play which is naturally integrated with the exercise of Information Technology with teachers' assistance. And the children could freely add the creative issues into story topics so as to enhance the unique thinking and image creation in order to promote Teaching Effectiveness.
- 5.2 Select Appropriate Teaching Style and Remain Teaching Passion: With different education and family background, teachers have individual but unique teaching style. Without imitating others, each teacher needs to be aware of and then build self Teaching Efficient Style with the pace with the young children's class learning situation and characteristics. Since the education policies are easy to bring parents form appearance value in leading the young children learn knowledge inappropriately. The kindergarten teachers need to guide and educate parents that the curriculums of kindergartens are not necessarily limited by textbooks, the courses are flexible and autonomous, and the implementation of Information Technology need to be tailored with each child from different family background. In order to keep teachers' teaching passion, teachers' distinct thinking directions could be strongly related with Information Technology instructional curriculum and also be related with individual kindergarten teacher's teaching style. Take the instruction in mutual creating curriculum plans for example. Many kindergartens are doing the projects in teacher-student cooperation on designing unique electronic storybooks. Young children indeed learn a lot of interesting experience from simple listening, appreciation, reading, to self-creation. With the sequential and in order learning plan, the children-centered curriculums are formed and implement in real situations for enhancing Teaching Effectiveness.
- 5.3 Observation and Promote Young Children's Internal Learning Passion: In observing children's interaction with teacher, with peers, with teaching material, and with prepared environment, teachers would get so much inspiring ideas in how to put the observation record into the self-reflection on the applications of information technology into early childhood education curriculum design and planning. Take the recording the instructions from which the language, behaviors, and learning of young student for example, teachers would have more opportunities in seeing through what children learn and how children learn and further, to understand where is the point children encounter difficulties. Therefore, each kindergarten teacher has to choose the appropriate

insistence on Teaching Belief to fit for each unique classroom. For elevating Development Appropriately Practice, through observation, teachers would be able to understand what is going on for each child. With the appropriate Information Technology materials, teachers can enhance young children's learning interests and accumulate the interactive experiences with young children. With the repeatedly revision and development for the instructions suitable for themselves, the educational quality and the teachers' professional growth in Teaching Effectiveness could be completed.

To sum up, the integration of teachers' Teaching Belief in Information Technology into kindergarten curriculum involves teachers meeting children's stage of development, both as individuals and as a part of the whole learning group. And on the other hand, it will help each individual meet challenges achieve appropriate learning goals. In order to fully realize multiple frame of the integration of Information Technology into the young children's learning, the further quality interviews with the young children and their parents and the on-site observations from the young children's interaction with teachers, peers, and Information Technology tools needs to be implemented.

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