The Survey on Teacher's Mathematics Teaching Belief in selected Kindergartens in Nanjing City, China

Chen Hui, Dr. Palamisamy Kowndar Veloo[2]

ABSTRACT

Based upon a review of literature, anthropologists, social psychologists, and philosophers and educationists have agreed upon a commonly accepted definition of beliefs; "beliefs are thought of as psychologically held understandings, premises, or propositions about the world that are felt to be true" (Richardson, 1996, p.103). In educational settings, Haney et al. (2003) defined beliefs as "one's convictions, philosophy, tenets, or opinions about teaching and learning" (p. 367). The beliefs that teachers hold are considered to be important as teaching belief tend to influence a teacher's classroom practice. This study aims to examines mathematics teaching beliefs of selected kindergartens teachers in the Nanjing city of China with a view to understanding what beliefs teachers hold. The data of this study were collected through questionnaire and interviews. The questionnaires were distributed to 300 teachers from the 14 randomly selected kindergartens in the urban Nanjing District. The findings of this study will contribute to widening the pool of knowledge about Chinese teachers' educational beliefs and in particular their beliefs with respect to students' learning mathematics in preschool.

[2] Faculty of Education, SEGI University, No 9, Jalan Teknology Taman Sains Selangor, Kota Damansara, PJU 5, 47810 Petaling Jaya, Selangor, Malaysia

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1. Introduction

Teachers' belief systems reflect personal theories about the nature of knowledge and knowing that, in turn, influence teachers' curriculum decision making and teaching approaches (Hofer & Pintrich, 1997; Lovat & Smith, 1995; Pajares, 1992). According to Thompson (1984) teachers' beliefs "seemed to be manifestations of unconsciously held views of expressions of verbal commitments to abstract ideas that may be thought of as part of a general ideology of teaching" (p. 112). They represent implicit assumptions about curriculum, schooling, students, teaching and learning, and knowledge and act as cognitive and affective filters through which new knowledge and experience is interpreted and enacted (Artzt & Armour Thomas, 1996; Lovat & Smith, 1995). Influencing teachers' beliefs, therefore, may be essential to changing teachers' classroom practices.

With the implementation of China's two-child policy, there has been a rapid increase in the number of students enrolled in early childhood education (ECE). As a result of concern over the rapidly growing number of preschoolers, researchers have urged the central government to pay attention to the impact of the implementation of universal ECE on the overall quality of ECE (Liu ,2010; Wang, 2014). Since 2010, most local governments have initiated comprehensive reforms for ECE by establishing political authorities, increasing financial input, and supporting teacher training programmes (Qin, 2013). Kindergarten teachers are a key factor in ensuring the quality of ECE. Faced with the rapidly growing preschool children base, on the one hand, ECE in China must greatly expand the number of kindergarten teachers, and at the

same time pay attention to teachers professional quality, which are two major challenges to the development of ECE. To meet the demand for ECE teachers in China, the government has increased the number of teacher education institutions providing preschool teacher education programmes. Since 2010, teacher education policies have focused on improving teachers' professional development. Through teacher education, teachers have been equipped with professional knowledge, skills and attitude (Fukkink & Lont, 2007), which has contributed to improving the quality of ECE (Kelley, Thornton & Daugherty, 2005; Riley & Roach, 2006). Among them, teachers' beliefs is an important sign and key dimension of teachers' professional development. On the other hand, since 1990s, China has begun a series of reforms on mathematics education. Improving the quality of teachers, especially improving their teaching beliefs, is one of the central tasks of current educational reform (Pang &Ye, 2000).

Given the importance of teacher beliefs, research on it is widely valued. Unfortunately, in the Chinese educational context there is a lack of research on Chinese preschool teachers' beliefs in mathematics. Thus, one of the questions this study was designed to ask is, "what are teachers' beliefs with respect to the nature of mathematics as rules and procedures to achieve one right answer or tools for thought and creative problem solving?" The study also explored other aspect of beliefs associated with traditional or inquiry-oriented beliefs. These are locus of generation of mathematics knowledge and teachers' self confidence in teaching mathematics to preschool children. This study aims to examine mathematics teaching beliefs of selected early childhood teachers in the Nanjing city of China with a view to understanding what mathematics teaching related beliefs do teachers' hold. The findings of this study will contribute to widening the pool of knowledge about Chinese teachers' educational beliefs and in particular their beliefs with respect to students' learning mathematics in preschool.

2. Literature Review

Beliefs are similar to attitudes and knowledge and much scholarly debate have attempted to determine just how beliefs, attitudes, and knowledge differ. Pajares (1992) who echoed Lortie's findings described the difficulty in distinguishing attitudes from beliefs in ways that researchers have defined and studied them. According to Davis and Andrzejewski (2009) teachers' beliefs exist on many levels from global to personal and serve as overarching frameworks for understanding and engaging with the world. They can be thought of as inner guiding principles that teachers' hold to be true, that serve as lenses through which new experiences can be understood. Teachers may hold on to beliefs that may have been formed without evidence and often they are held on to even in the face of contradictory evidence. They become a part of teachers' identities. Beliefs, and their influence, tend to be unexamined by teachers because many are implicit, unarticulated, or unconscious. Failure to examine beliefs can have negative consequences as they guide practice and priorities, determined what is to be ignored, influenced decision making, and shaped what types of interactions are valued (Davis & Andrzejewski, 2009).

The teachers' teaching beliefs refer to what teachers believe about teaching, teacher’s role, curriculum, students learning and other relevant factors in teaching situations and instructional procedures. It also includes the opinions, attitudes and psychological tendencies of the teacher towards the relevant factors in the teaching process which they hold and believe to be true (Borg, 2001; Porter & Freeman, 1986). A substantial body of research suggests that teachers' beliefs and values about teaching and learning affect their teaching practices (see reviews by Clark & Peterson, 1986; Fang, 1996; Kagan, 1992; Thompson, 1992). Investigating and if necessary, influencing teachers' beliefs, therefore, may be an essential first step to changing teachers' classroom practices.

In mathematics education, some scholars have divided the dimensions of mathematics teaching beliefs according to the characteristics of mathematics. The current classifications of beliefs in mathematics education are about the nature of mathematics and the teaching and learning of mathematics (Cooney, 2003; Cross, 2009; Ernest, 1989; Speer, 2008; Thompson, 1992).Beswick (2007) identified nine crucial beliefs of teachers that emerged from their classroom observations, interviews with teachers and students survey. He classified these beliefs into three categories: belief about nature of mathematics, belief about mathematics learning and belief about the role of teachers. Similarly, Eynde, Corte, and Verschaffel (2003) summarized the beliefs about mathematics under four different categories: belief about the natures of mathematics and mathematical learning, belief about the self in the context of mathematics learning and problem solving, beliefs about the mathematics teaching and epistemological beliefs. Moreover, Ernest (1989) described the key belief components: nature of mathematics, nature of mathematics teaching, and process of mathematics learning that affect the mathematics teaching leaching activities. It can be seen from the above existing research that scholars have basically the same division of the dimensions of mathematics teaching beliefs. Based on these literatures, the researcher of this study summarized the mathematics teaching beliefs into three dimensions: belief about nature of mathematics, belief about mathematics teaching and learning, belief about the self-role of teachers. The four specific levels of the mathematics teaching beliefs in the questionnaire used in this study correspond to the above three dimensions.

Teacher socialization is a complex process of dynamic development, and teaching belief is influenced as a result of teacher socialization. Therefore, the teaching beliefs of teachers are not invariant, and the interaction of individual, society and individual and society will continue to exert its influence on the teaching beliefs of teachers. According to the existing research, scholars have not reached a consensus on what factors influence the teaching beliefs of

teachers, but most of the researchers discuss them from two aspects: personal factors and environmental factors.

First, from the teachers' personal point of view, the researchers believe that personal factors such as teachers' gender, personality traits, educational background, teaching experience and other personal factors may have a direct impact on their teaching beliefs. For example, Frey (1987) studied the types of teaching beliefs of male and female teachers in secondary schools. As a result of his research he found that the types of beliefs of male and female teachers were different. The male teachers were mostly in an authoritative type and the female teachers were mostly in the democratic type. Lin Qingcai (1990) points out that the teachers' personality traits do affect the teachers teaching beliefs. Zhong Renqin (1994) believes that the teachers' personal characteristics that affect teaching include personal life history, previous concepts, role expectations, and personality. Tang Renyan (1993) found that primary school teachers who graduated from normal university, teachers college or university education departments in China tend to be more progressive in their teaching beliefs than those from regular colleges and teachers colleges or normal schools. Frey (1987), in a study of secondary school teachers, pointed out that the teaching beliefs of male and female secondary school teachers vary with their length of service. Brousseau, Book, and Byers (1988) have pointed out that the teaching experience of teachers is a very important factor in influencing teachers' beliefs. Teachers with different teaching experience have very significant differences in teaching behavior. New teachers tend to respond more slowly than experienced teachers when confronted with the situation in teaching.

Second, from the perspective of the external environment, the working environment, campus culture, evaluation mechanism, parental expectations and requirements all have an important impact on teachers teaching beliefs.

For example, Yi (2004) believes that the external environmental factors that affect teachers teaching beliefs include school environment, leadership, teachers and parents, education administration department, influence of educational theory researchers, social culture, social events, and so on.

In conclusion, researchers have analyzed the influencing factors of teachers teaching beliefs from different perspectives, but individual factors and external environmental factors are the common concerns of researchers. Individual factors mainly include teachers age, gender, personality trait, educational experience and so on. Environmental factors mainly include school atmosphere, social culture, and so on. This study mainly discusses the influence of individual factors on teachers teaching beliefs, and the existing research results have a strong reference value to the exploration of this problem.

This study is aimed at the specific discipline of kindergarten mathematics, from the aspects of mathematics teaching, to investigate the levels of the beliefs of kindergarten teachers in mathematics teaching and if there are significant Differences of teaching belief under the teachers' individual factor variables, which is helpful to help kindergarten teachers understand the importance of their own mathematics teaching beliefs in children's mathematics education and guide the preschool teachers to examine their own deficiencies in mathematics teaching beliefs, promote the expansion and renewal of teachers' mathematics teaching beliefs, and enable them to adjust and improve teaching methods in time to improve the effectiveness of kindergarten mathematics classroom teaching.

Research Questions

The purpose of this study was to investigate teacher’s mathematics teaching

belief in Chinese kindergartens. Specifically, this study aimed to answer the following research questions:

RQ1: What are the overall beliefs about teaching and learning mathematics held by kindergarten teachers?

RQ1a: Are there significant differences in mathematics teaching beliefs among teachers with different educational levels?

RQ1b: Are there significant differences in mathematics teaching beliefs among teachers with different years of teaching experience?

RQ1c: Are there significant differences in mathematics teaching beliefs between teachers from different types of kindergartens?

RQ1d: Are there significant differences in mathematics teaching beliefs among teachers with respect to their level of participation in teachers' post-employment training?

3. Methodology

Research Design

This study adopted a mixed-method non-experimental survey design. This study is a descriptive study in that it does not involve any form of experimentation to test causality between independent and dependent variables in the study.

Samples

The sample involved in this study is 300 kindergarten teachers from selected

8 public kindergartens and 6 private kindergartens. All these 300 kindergarten teachers were requested to complete a Questionnaire in this study. The sample contains a sub-sample for interview which is 5 teachers from one public kindergarten and 5 teachers from one private kindergarten. The two kindergartens were randomly selected from the sample of kindergartens. The 10 teachers were divided into Group A and Group B in two focus interview groups. Teachers from Group A were referred to a Respondents GA1(Group A1), GA2, GA3, GA4 and GA5. In same way, teachers from Group B were referred to as Respondents GB1(Group B1), GB2, GB3, GB4 and GB5.

The questionnaire was distributed to these 300 teachers and the researcher obtained a 100% response rate. After data cleaning, a total of 275 responses were found to be suitable for further analysis, effective rate of 91.6%. The description of teachers' information will be presented in Table.1 to Table. 4.

Table 1

Distribution of Respondents by Education Level (n=275)

Profile of Teachers	***Value***	***Frequency***	***Percent***
Education Level	College degree	106	38.5
	Undergraduate degree	169	61.5

Table 2

Distribution of Respondents by Teaching Years (n=275)

Profile of Teachers	*Value*	*Frequency*	*Percent*
Teaching Years	Less than 5(included) years	138	50.2
	6-10 years	42	15.3
	Over 10 years	95	34.5

Table 3

Distribution of Respondents by Kindergarten Type (n=275)

Profile of Teachers	***Value***	***Frequency***	***Percentage***
Kindergarten Type	Public	151	54.9
	Private	124	45.1

Table 4

Distribution of Respondents by Frequency of Post-employment Training (n=275)

Profile of Teachers	***Value***	***Frequency***	***Percentage***
Post-employment Training	Occasionally	30	10.9
	Regularly	245	89.1

Instrument

This study adopted the mixed-methods approach comprised both quantitative and qualitative components. Two research instruments were used in the study to collect data, one is a 70-item survey questionnaire and the other a set of semi-structured interview questions. The survey questionnaire used in this study comprised three sections A, B and C. Section A of the instrument requested respondents to provide demographic information about themselves and their families. The main section of the instrument was section B, a 40-item beliefs survey questionnaire which investigated the overall kindergarten teachers' mathematics teaching beliefs and was obtained from the review of literature (Platas, 2008). Section C of the questionnaire comprised 30-items which explored teaching related behaviors of early childhood teachers and was extracted and combined from two Chinese studies.

Reliability and Validity

Cronbach's alpha coefficients SPSS version 22 was used to check the reliability of the questionnaire in this study. The Cronbach's alpha was found to be 0.91 which is accepted as it is exceeding the ideal radio of the reliability test (Pallant, 2010). On the other hand, Validity and Reliability of interview in this study was established by expert opinion of a panel of experts at SEGi University and pilot study.The instruments were be found to be highly reliable and valid by conducting pilot study and using the viewpoints of a panel of experts.

Data Collection

The data collection of this study is carried out in three steps, the first step is to conduct a pilot study to check the reliability and construct validity of the instruments and test the data collection proceed; The second step is to conduct actual study, first, data collection via questionnaire which is 300 teachers from selected kindergartens were requested to complete the questionnaire; The

third step is data collection via interview which is Semi-Structured interviews with teachers in selected two Kindergartens by Focus Group Interview.

Data Analysis

Quantitative data were collected in this study. The data were analyzed using Statistical Package for the Social Science (SPSS) version 22.0. The data analysis divided into descriptive statistics analysis and inferential statistics analysis.

Descriptive Statistics. This analysis describes in detail the respondents and demographic information of the sample of teaches involved in the study.

Inferential statistics. Appropriate inferential statistical procedures will be used to analyse the quantitative data to answer the research questions posed in the study. First of all, the basic information of teachers, their beliefs were identified by computing means and standard deviation. Secondly, various group differences including (Education Level, Teaching years, Kindergarten type and Post-employment Training) were evaluated by means of t-test and ANOVA.

The qualitative data collected during interview will be transcribed and the text will be analyzed for themes. these themes will be related to the data obtained from the quantitative analysis to further supplement the qualitative data.

4. Results

The first research question in this study examined the overall kindergarten

teachers' mathematics teaching beliefs. As mentioned in Chapter 2 literature review, Taiwan scholars Zhu Yuanyu and Ye Yuzhu (2000) divided teachers' teaching beliefs into two orientations: "traditional" and "progressive". The traditional orientation tends to adopt the viewpoint of restriction, conservativeness, and teacher-centered norms; the progressive orientation tends to adopt the viewpoints of freedom, openness, student center, and development orientation (Zhu & Ye, 2000).

Teachers responded on a five-point Likert scale to each of the items on the questionnaire. In this questionnaire, the highest score for each question was 5 points, the lowest was 1 point, and the middle score was 3. Therefore, the more respondents with scores higher than 3 points, the more their beliefs tended to be progressive. The score of 3 or close to 3 indicates that their beliefs were neutral while below 3 points indicates traditional. Table 5 below show the mean score of overall teachers' beliefs about teaching and learning mathematics, and on each of the sub-scales held by kindergarten teachers.

Table 5: *Distribution of Means and Standard Deviations for Teachers' Overall Mathematics Teaching Beliefs (n=275)*

Sub-scales	No of items	Mean(M)	Std. Dev□SD□
Age-appropriateness	10	3.83	.56
Locus of Generation of Mathematical knowledge	12	3.30	.31
Primary Classroom Goals	8	3.86	.58
Confidence Level in Mathematics instruction	10	3.71	.56
Overall Mathematics Teaching Beliefs	40	3.65	.38

Entries in table 5 show distribution of means and standard deviations for teachers' overall mathematics teaching beliefs. The teacher's overall teaching belief mean score was higher than the mid-point value of 3 (M=3.65, SD=0.38). The results show that the overall mathematics teaching beliefs of teachers was moderately progressive. In addition, it can be seen from the table that the mean scores of all dimensions of teaching beliefs were higher than the mid-point value of 3, which indicates that the beliefs of the teachers in all dimensions were also progressive.

For this question, the author conducted interviews and obtained qualitative findings of teachers' beliefs in each dimension.The findings of the interview are shown in Table 6 below.

Table 6: *Summary of Question 1 Interview findings*

Sub-scales	Responses to the interview
Age-appropriateness of math instruction	All the teachers interviewed agreed that mathematics is suitable for preschoolers and they are able to receive and follow mathematics instruction. "I think that whether it is the need of reality or the interest of the child, preschoolers are suitable and need to receive mathematics instruction." (GB1)
Locus of Generation of Mathematical knowledge	The teachers all agreed that the appropriate way for young children to learn mathematics was games and operations. "The suitable way for children to learn mathematics in preschool should be through autonomous exploration and situational learning."(GA3)
Mathematical Development	The teachers agreed that math is an important part of the

Primary Classroom Goals of preschool Education	preschool curriculum and math activities are good opportunities to develop social skills and emotions in preschool. "...Kindergarten mathematics education should make children feel that mathematics is interesting and useful. This is a goal of emotional attitudes. Another aspect is to cultivate children's ability to explore and solve problems themselves..."(GB5)
Teacher's Confidence Level in Mathematics instruction	Most teachers felt confident in mathematics teaching. " I feel that mathematics activities are very well organized for me."(GB4) "Mathematical teaching makes me feel very fulfilled."(GA5)

According to the responses of the teachers interviewed, the quantitative findings of this question were well supported.

Investigating the differences in mathematics teaching beliefs of kindergarten teachers under different individual factors was one of the important goals of this study. This section presents the results of the differential analysis of the mathematics teaching beliefs of kindergarten teachers. An Independent Sample t-test (see Table 7) was conducted for two types of teachers with college degrees and undergraduate degrees to test whether there were significant differences between the two groups in terms of mathematical teaching beliefs and teaching behaviors at the overall and various dimensions.

Table 7

Distribution of Means, Standard Deviations, t-value and p-value of Mathematics Teaching Beliefs by Teachers' education level

Sub-scales	Education Level	N	Mean(M)	Std. Dev.(SD)	t	p
Age-appropriateness	College degree	106	3.72	0.63	-2.29	.02*
	Undergraduate degree	169	3.89	0.54		
Locus of Generation of Mathematical knowledge	College degree	106	3.29	0.32	-0.77	.44
	Undergraduate degree	169	3.32	0.30		
Primary Classroom Goals	College degree	106	3.75	0.59	-2.48	.01*
	Undergraduate degree	169	3.93	0.57		
Teachers Confidence in Mathematics Instruction	College degree	106	3.68	0.55	-0.78	.44
	Undergraduate degree	169	3.73	0.56		
Overall Mathematics Teaching Beliefs	College degree	106	3.59	0.39	-2.10	.04*
	Undergraduate degree	169	3.69	0.37		
	Undergraduate degree	169	3.68	.45		

*. Statistically significant at $p < 0.05$

The table 7 results of the t-test show that the differences in the overall teaching belief between the sample means are statistically significant, t (272) =-2.10, p<0.05. The mean overall teaching beliefs of undergraduate degree teachers were statistically significantly higher than that of the college degree teachers, indicating that the overall teaching beliefs of the undergraduate teachers were

more progressive than the college degrees teachers. It can also be seen from the results that there is a significant difference in the teaching beliefs between the teachers with college degrees and the teachers with undergraduate degrees, such as the factor of Age-appropriateness, $t(272) = -2.29$, $p < 0.05$; similarly significant differences were also reflected in the factor of Primary classroom goals, $t(272) = -2.48$, $p < 0.05$. There were no significant differences in the mean scores for the other two levels.

An one-way between-groups analysis of variance was conducted to explore the differences in teachers' mathematics teaching beliefs among the teachers with varying years of teaching experience. The results of the analysis are shown in Table 8 below.

Table 8

Analysis of Variance Table for Overall Teachers' Mathematics Teaching Beliefs Based on Teachers' Teaching Years

Sub-scales	Source	Sum of Squares	df	Mean Square	F	Sig.
Age-appropriateness	Between Groups	2.659	2	1.33	4.06	0.02*
	Within Groups	89.172	272	.33		
	Total	91.831	274			
Locus of Generation of Mathematical knowledge	Between Groups	.073	2	.04	.39	0.68
	Within Groups	25.542	272	.09		
	Total	25.614	274			
Primary Classroom Goals	Between Groups	1.163	2	.58	1.74	0.18
	Within Groups	91.197	272	.34		
	Total	92.361	274			
Teachers confidence in Mathematics instruction	Between Groups	1.913	2	.96	3.14	0.045*
	Within Groups	82.964	272	.31		
	Total	84.877	274			
Overall Mathematics Teaching Beliefs	Between Groups	1.073	2	.54	3.80	0.02*
	Within Groups	38.395	272	.14		
	Total	39.468	274			

*. The mean difference is significant at $p<.05$

From the analysis results of one-way ANOVA in above Table 8, it can be seen that there was a significant difference in the overall teaching beliefs of teachers of all teaching ages, $F(2,272) = 3.80$, $p<0.05$. With respect to teaching beliefs in the sub-scales there were significant differences in teachers' beliefs of Age-appropriateness [$F(2,272)=4.06$, $p<0.05$] and Teachers confidence in Mathematics instruction [$F(2,272)=3.14$, $p<0.05$]. There were no statistically significant differences among other beliefs sub-scales. Tukey's post-hoc test was used to determine the differences between the categories of teachers of all teaching years in the overall teaching beliefs and the two dimensions. The results of the analysis are shown in Table 9 below.

Table 9

Tukey Post Hoc Test Table for Teachers' Teaching Beliefs Based on Teachers' Teaching Years

Dependent Variable	(I) Teaching years	(J) Teaching years	Mean Difference (I-J)	Std. Error	Sig.
Age-appropriateness	Less than 5(included) years	6-10 years	-.02	.10	.81
		Over 10 years	-.21*	.08	.01*
	6-10 years	Less than 5(included) years	.02	.10	.81
		Over 10 years	-.19	.11	.08
Teacher's confidence in Mathematics instruction	Less than 5(included) years	6-10 years	-.03	.10	.79
		Over 10 years	-.18*	.07	.02*
	6-10 years	Less than 5 (included)years	.03	.10	.79
		Over 10 year	-.15	.10	.13
Overall Mathematics Teaching Beliefs	Less than 5(included) years	6-10 years	-.00	.07	.96
		Over 10 years	-.13*	.05	.01*
	6-10 years	Less than 5(included) years	.00	.07	.96
		Over 10 years	-.13	.07	.07

*. The mean difference is significant at $p<.05$

The Tukey post-hoc test results shown in Table 9, reveals that there was a statistically significant difference in the mean scores between the teacher with less than 5 years of teaching experience [M=3.60 (0.38)] and teachers with over 10 years of teaching experience [M=3.73(0.37)] in their overall teaching beliefs, $p<0.05$. Teachers with over 10 years of teaching experience are more progressive in their beliefs than teachers with less than 5 years of teaching experience. There were no significant differences in the overall teaching beliefs between the other teaching years groups.

The independent sample t-test was used to detect the differences in teaching beliefs between the two types of kindergarten teachers. The test results are shown in Table 10 below.

Table 10

Distribution of Means, Standard Deviations, t-value and p-value of Mathematics Teaching Beliefs by kindergarten type of teachers

Mathematics Teaching Beliefs	Kindergarten Type	N	Mean	Std. Dev	*t*	*p*
Age-appropriateness	Public	151	3.96	.50	4.40	.000***
	Private	124	3.66	.63		
Locus of Generation of Mathematical knowledge	Public	151	3.32	.31	.88	.379
	Private	124	3.29	.30		
Primary Classroom Goals	Public	151	4.01	.52	4.76	.000***
	Private	124	3.69	.60		
Teachers comfort in Mathematics instruction	Public	151	3.79	.54	2.65	.008**
	Private	124	3.61	.56		
Overall Mathematics Teaching Beliefs	Public	151	3.73	.33	4.34	.000***
	Private	124	3.54	.41		

***. significant at p<0.01; ***. significant at p<0.001*

The t-test analysis of the mean scores show in table 10 revealed that there were statistically significant differences in the overall teaching beliefs between the two types of teachers, t(273)=4.34, p<0.001. Public kindergarten teachers' beliefs were significantly more progressive than teachers of private kindergartens in their overall teaching beliefs. In the Age-appropriateness dimension the beliefs of public school kindergarten teachers were statistically significantly different from private school kindergarten teachers, t (273)=4.40,

$p<0.001$; Statistically significance differences were also noted between public and private school kindergarten teachers in two other dimensions, the Primary Classroom Goals, $t\ (273)=4.76$, $p<0.001$, and Teacher's confidence in Mathematics Instruction, $t\ (273)=2.65$, $p<0.01$. No statistically significant difference was noted in the Locus of Generation of Mathematical knowledge dimension.

An Independent Sample t-test (see Table 11) was conducted for two types of teachers that chose to train as "occasionally" and "regularly" to test whether there were significant differences in mathematics teaching beliefs between the two groups in terms of overall and all dimensions.

Table 11

Distribution of Means, Standard Deviations, t-value and p-value of Mathematics Teaching Beliefs by Teacher Training Frequency

Sub-scales	Teacher Training Frequency	N	Mean	Std. Dev.(SD)	*t*	*p*
Age-appropriateness	Occasionally	30	3.60	.44	-2.23	.027*
	Regularly	245	3.85	.59		
Locus of Generation of Mathematical knowledge	Occasionally	30	3.22	.26	-1.56	.119
	Regularly	245	3.32	.31		
Primary Classroom Goals	Occasionally	30	3.62	.55	-2.45	.015*
	Regularly	245	3.89	.58		
Teachers comfort in Mathematics instruction	Occasionally	30	3.61	.70	-1.02	.310
	Regularly	245	3.72	.54		
Overall Mathematics Teaching Beliefs	Occasionally	30	3.49	.38	-2.35	.019*
	Regularly	245	3.67	.38		

*. The mean difference is significant at p<.05

The Table 11 results of the t-test showed that there was a significant difference in the overall teaching belief between the two categories of teachers, t (272) = -2.35, p<0.05. Teachers who regularly participated in teacher training have significantly higher overall progressive teaching beliefs than teachers who occasionally participated in teacher training. Further the two categories of teachers had significant differences in teaching beliefs on other dimensions, such as Age-appropriateness level, t (272) =-2.22, p=<0.05. and in the Primary

Classroom Goals level, t (272) =-2.45, p=<0.05. There were no significant differences at the other two levels.

5. Discussion and Conclusion

The results obtained from this study found that the overall mathematics teaching beliefs of the kindergarten teachers who participated in this study tended to be progressive. This indicated that with the deepening of the kindergarten mathematics education curriculum reform, teachers are beginning to abandon some traditional mathematics education concepts and are developing modern mathematics teaching beliefs. In addition, the results show that teachers also have higher levels of teaching belief at various sub-scales, which showed the beliefs of teachers were more in-depth about the nature of kindergarten teaching. However, this research finding also showed that the mean score of"Classroom locus of generation of mathematical knowledge (teacher vs child)"was slightly lower than that of other belief sub-scales. This indicated that there was still some level of traditional influence in teachers' beliefs on how to teach children mathematics and how children learn mathematics. Therefore, teachers should further strengthen the research on the cognitive characteristics of children's mathematics learning in the usual education and teaching, so as to better grasp the difficulty of children's mathematics education content, provide appropriate mathematics learning materials, and choose appropriate teaching methods, thereby effectively guarantee the quality of kindergarten mathematics teaching.

In the difference survey of teaching beliefs, the results showed that there were differences in the mathematics teaching of kindergarten teachers under all the individual factor variables involved in this study, that is, the mathematics teaching beliefs of kindergarten teachers with different educational levels, different years of teaching experience, different kindergarten types and different post-employment training frequency have certain differences.

Among them, the differences in mathematics teaching beliefs between teachers of different types of kindergartens were more obvious. This result verified the point mentioned in the literature review: teachers themselves were one of the factors influencing teaching beliefs.

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