

Teachers' Perception and Status of Science Education in Early Childhood Educational Institutions

Jong-Su Park

Chung-Ang University

Su-Young Yang¹⁾

Chung-Ang University

Abstract

This study conducted a survey on teachers' perception and the status of science education in two institutions: kindergarten and childcare center. A total of 204 in-service teachers participated in this survey through responding to a questionnaire. The questionnaire consisted of two parts: the status and the teachers' recognition on science education. The collected data were analyzed according to teacher's variables: type of institution, teaching experience, and their level of education. In the results, there were significant differences according to teacher's variables. These results can be used to further improve teacher education and to activate science education.

Keywords : science education, childcare center, kindergarten

Corresponding author, ¹⁾ swimmingyang@hanmail.net

Introduction

The development of scientific techniques has advanced civilization and enriched the level of life. In contrary, human alienation and environmental destruction appeared as a threat to human survival. Consequently, in the 1990s, the “make public scientific” flow stressed to nurture a scientifically literate person. This person possesses a positive-mind for decision-making through scientific thinking in their daily life, even beyond an existing learner who has a passive attitude for scientific knowledge (Cho, 2009; Liu, 2009; NRC, 1996). According to the “humanization of science” in the 2000s, children were exposed to information technology (IT) from early childhood. This stimulated children to have an active attitude as a practical user of science, which influenced on scientific interest and achievement in later-age and adulthood (Cho, 2010). Thus, this historical flow influenced on science education for children.

In 2002, the National Association for the Education of Young Children (NAEYC) stated that the importance of science education which begins at early childhood. Children instinctively are curious and they like navigating around the world through their everyday experiences. Therefore, early childhood is the best time to develop their scientific attitude and interest (Han, 2010; Koch, 1999).

After the 1990s, Korea pushed to change science education from teacher-centered education¹ to child-centered education² by the effects of Constructivist. Accordingly, Ministry of Education, Science and Technology (2008) stated that science education for children needs to operate through a life-centered integrated curriculum. This curriculum reflects the child’s experience and interest. Also, it should help our children acquire respecting attitude for nature, explore nature creatively, and develop the basic scientific literacy for solving problems logically and creatively.

However, many researches which have studied about the status and awareness of early childhood science education after the 1990s, found that science education is still lead by

¹ Teacher-centered education means that children learn passively with materials given by teachers according to the established procedures. This is an effective way to teach many children at once. On the other hand, it can make children lose interest in science and reduce their practical ability in the real world.

² Child-centered science education recognizes children as active thinkers and practical doers through emphasizing the child's thinking processes. Thus, this stresses for children to enjoy the process of performing in a variety of ways and to develop their ability to explore.

teachers (Han & Kim, 2006; Lee & Lee, 2002). Also, the problems of the teachers' perception were reported. According to Kim & Kim (2004), early childhood teachers still perceive science education as a difficult thing. Lee (2009) also reported that early childhood teachers feel science education as "something of a burden and fear", "class only to show". These results are not desirable science education status for children (Kim, 1990). Teacher's perception is considered the most important factor that influences on the quality of science education. Change in a teacher's perception develops their practice ability and even effects on the quality of science education (You & Hwang, 2003). Therefore, in order to efficiently solve these problems, the teacher's perception has to be considered as the most highlighted factor (Kwon, 2007; NRC, 1996). The change of teacher's perception can be decided by teacher education (Ann, 2002).

Various teacher educations for pre-service teachers and in-service teachers have been being studied. Ann (2002), Kim (2005), Song (2006) developed a model for raising science teaching ability through providing opportunities of reflective thinking to teachers based on the Constructivist theory. Besides, Cho (2007) developed the early childhood teacher education model based on a Feminist science education for the majority sex of early childhood teachers. Roh (2011) examined the change of pre-service teachers' awareness on science education through applying the problem based learning (PBL). Yun, Park, and Ryu (2007) suggested that scientific knowledge and teaching methods need to be provided through reorganizing the current curriculum, based on kindergarten teachers' awareness and experience on science. Furthermore, Hwang, Song, and Cho (2004) proposed the inquiry-based science experiments and practical activities to ensure pre-service teacher's direct involvement and interest in science education.

As stated, various studies on teacher education were carried out to activate science education. However, looking into recent status, most teachers still regard science education as a difficult thing (Lee, 2009; Oh, 2010). Because, teacher education which practiced in the real field, is theory-centered and a one-way lecture, rather than practical activity-centered and interactive class (Kim & Kim, 2004; Oh & Hwang, 2011). Also, according to Cho (1999), continuous teacher education from pre-service teacher is important because teachers can acquire the practical science knowledge and practical ability at real world through continuous participation at the process of scientific exploration. However, the research on the status of

teacher education reported that teacher education is conducted only a few times (Oh & Hwang, 2011). According to Lee & Lee (2002) and Oh (2010), they indicated that the cause of the problem in teacher education is that the existing teacher education does not reflect the current status and the teachers' perception according to the teacher's variables. This consists with Howes (2002), who stated that the effort for re-conceptualism according to current status and various variables are required in order to access quality science education. Therefore, teacher education in the future should consider the teacher's perception and the current status according to teacher's variables.

Recently, Korea announced an implementation plan that will integrate curriculums which have been divided into kindergarten and childcare center for five-years-old children (Cho, 2011, May 2). Integrating the separate curriculums can reduce unnecessary waste of budgets and lay the groundwork for implementing a high quality standard curriculum for all five-years-old children. Thus, this has something favorable, but it can be worrisome due to the hasty integration in a short period, regardless of the nature of two institutions.

Childcare centers and kindergarten have differences in the operation and teachers' perception aspects, although both charge of 3-5 years old children (Oh, 2010). Childcare centers particularly emphasize the teacher's role for caring rather than educating owing to long daytime for nursery and care. Also, for childcare center teachers, it may be difficult to consider development features for all children, because they take on a wider range of ages than kindergarten that only takes children three to five year olds. In addition, the pre-teacher education courses of childcare center and kindergarten teachers are different, from the one-year course to the four-year course. Thus, in this time, teacher education needs to consider the current status and teachers' perception on science education in order to reduce the concern about conducting an integrated curriculum.

Therefore, the purpose of this study is to make clear of any differences there are in teachers' recognition and status of science education according to teacher's variables. The results of this study will provide basic information for teacher education, and teacher education which reflects the different status and teachers' perception according to teacher's variables will be a foundation to activate science education in the future.

For the purpose of this study, two research questions were formulated as follows:

Research Questions

1. What is the status of science education in early childhood educational institutions?
 - 1-1. Between childcare center and kindergarten, is there a significant difference in status of science education depending on the type of institution?
 - 1-2. Is there a significant difference in status of science education depending on teachers' teaching experience and level of education?
2. What is teachers' perception on science education in early childhood educational institutions?
 - 2-1. Between childcare center and kindergarten teachers, is there a significant difference in recognition on science education depending on the type of institution?
 - 2-2. Is there a significant difference in recognition on science education depending on teachers' teaching experience and level of education?

Method

Participants

In this study, the participants are in-service teachers working at childcare centers³ and kindergarten⁴ located in Seoul and Gyeonggi province. Fifty early childhood educational institutions (kindergarten: 25, childcare center: 25) were selected by random sampling in June 2011. Researchers explained the intention and purpose of this survey to the directors on the phone and asked for their cooperation. The questionnaires were distributed and collected via email. Collected questionnaires were a total of 219 copies. Among them, some questionnaires were discarded due to insincere responses. Therefore, a total of 204 copies (101 from childcare center, 103 from kindergarten) were used for analysis. The detailed characteristics of participants are present as Table 1.

³ The institution for 0~5 years old children

⁴ The institution for 3~5 years old children

Table 1. *Characteristics of Participants*

Variable	Category	Frequency	Percentage	Total
Type of Institution	Childcare Center	Public & Corporate	34	16.7
		Private	67	32.8
	Kindergarten	National & Public	34	16.7
		Private	69	33.8
Teachers' Teaching Experience	Less than 1 year	16	7.8	204
	1~2 years	33	16.2	
	3-5 years	86	42.2	
	6-9 years	40	19.6	
	More than 10 years	29	14.2	
Teachers' Level of Education	1 year Course Education Graduation	28	13.7	204
	College Graduation	62	30.4	
	University Graduation	82	40.2	
	Graduate School	22	10.8	
	Others	10	4.9	

Research Tools

In this study, “Questionnaire for Analysis on status of child science education” was used, which had been created, complemented and corrected by Oh (2009, 2010). This questionnaire consisted of twenty-eight questions. It was divided into two parts: the status and the teachers' recognition on science education. In detail, the questions for status of science education were subdivided into three parts: 1) The environmental composition with five questions 2) The operation of science education with fourteen questions, and 3) The assessment, which consist three questions. The teacher's recognition part was composed of six questions. Internal consistency reliability (Cronbach's α) in questions of each item is 0.80 to 0.84.

Data Analysis

In order to verify the teachers' recognition and the status of science education according to teacher's variables, independent variables were made up of three factors: type of institution,

teachers' teaching experience, and teachers' level of education. The type of institution as the central variable analyzed the teachers' recognition and the status of science education, and other variables were also used to increase the explanatory power. The collected data was analyzed with the SPSS 18.0 program, the frequency and percentage of data was calculated by Frequency Analysis. In order to verify the difference according to the institutions type and other teacher's variables, Chi Square (Cross Tabulation Analysis) was used.

Results

The results of analyzing teachers' perception and status of science education in early childhood educational institutions were presented according to the research questions.

Status of Science Education in Early Childhood Educational Institutions

According to the 3 sub-factors of status, the differences based on the type of institution, teachers' teaching experience, teachers' level of education are shown as follows.

Status of Environmental Composition

As shown in Table 2, generally most teachers at both institutions responded that the teaching materials for science experimental activity are lacking (childcare center: 52.5%, kindergarten: 45.6%). In response, childcare centers were higher than kindergarten. The result of verifying the difference between the two institutions showed that there was a significant difference ($\chi^2=21.929$, $p=.000$). According to teachers' teaching experience ($\chi^2=55.960$, $p=.000$) and teachers' level of education ($\chi^2=59.234$, $p=.000$), there were significant differences. Teachers with less than three years teaching experience (70% and more) and one-year course graduates (71.4%) replied the most to "lacking". In the question regarding facility equipment, the same result was shown. Thus, kindergarten teachers, teachers with more teaching experience and higher level of education graduates seem to be more satisfied with teaching materials and facility equipment than other teacher groups.

Table 2. Degree of Teaching Materials Provided for Science Experimental Activity

Environmental Factor	Type of Institution	Quite Sufficient	Sufficient	So-so	Lacking	Very Lacking	Total	χ^2
Teaching Materials for Science	Childcare Center	0	<u>2</u> (2.0)	46(45.5)	<u>28</u> (27.7)	25(24.8)	101(100)	21.929***
	Kindergarten	0	<u>24</u> (23.3)	32(31.1)	<u>28</u> (27.2)	19(18.4)	103(100)	

***p<.001

Operating Status of Science Education

As shown in Table 3, the results of comparing the responses showed that childcare center teachers responded the most to “free choice activities” (57.4%). In kindergarten, the “experimental activities” (53.4%) were the most. The result of verifying the difference between childcare center and kindergarten showed that there was a significant difference ($\chi^2=17.040\sim33.745$, $p=.001\sim.000$). This also showed a significant differences according to the teachers' teaching experience ($\chi^2=38.387$, $p=.000$) and the teachers' level of education ($\chi^2=125.669$, $p=.000$). Teachers with more than six years teaching experience (50.0~55.2%) and graduate school leavers (86.4%) showed the highest ratios at “experimental activities”, while teachers with less than six years teaching experience (47.7~81.3%) and one-year course graduates (57.1%) showed a higher ratio for “free choice activities”.

Table 3. Activity Method Using for Science Education

Variable	Category	Investigation & Discussion	Experimental Activities	Field Trip	Free Choice Activities	Total	χ^2
Type of Institution	Childcare Center	8(7.9)	18(17.8)	17(16.8)	<u>58</u> (57.4)	101(100)	33.745***
	Kindergarten	9(8.7)	<u>55</u> (53.4)	3(2.9)	36(35.0)	103(100)	

***p<.001

Assessment

As shown in Table 4, the results of comparing the responses showed that both institutions consider the most “appropriateness of child development” (childcare center: 61.4%,

kindergarten: 38.8%). The response for “selection and organization of educational activity” which relates to practical teaching method also showed a difference (childcare center: 11.9%, kindergarten: 31.1%). The results of verifying the difference between childcare center and kindergarten showed that there was a significant difference ($\chi^2=16.905$, $p=.001$). In the case of the teachers' level of education ($\chi^2=55.322$, $p=.000$) and teachers' teaching experience ($\chi^2=89.008$, $p=.000$), there were substantial differences. Graduate school leavers and university graduates responded mostly to “selection and organization of educational activity” (32.9~54.5%) and “appropriateness of child development” (40.9~46.3%), while college and one year course graduates responded mostly to “appropriateness of child development” (51.6~53.6%).

Table 4. *Focus on Assessment*

Variable	Category	Selection and Organization of Educational Activity	Adequacy of Educational Resources	Appropriateness of Teaching Methods	Appropriateness of Child Development	χ^2
Type of Institution	Childcare Center	<u>12(11.9)</u>	24(23.8)	3(3.0)	<u>62(61.4)</u>	16.905**
	Kindergarten	<u>32(31.1)</u>	22(21.4)	9(8.7)	<u>40(38.8)</u>	

** $p<.01$

Teachers' Perception on Science Education in Early Childhood Educational Institutions

In the results of analyzing the childcare center and kindergarten teachers' responses on “the degree of importance of science education”, both institution teachers showed a high response rate, but kindergarten teachers (92.2%) showed a greater response rate than childcare center (78.2%). The results of verifying the difference between childcare center and kindergarten showed that there was a significant difference ($\chi^2=17.915$, $p=.000$). Additionally, there was a significant difference depending on the teachers' teaching experience ($\chi^2=18.490$, $p=.018$). However, there is no significant difference according to the teachers' level of education. Nonetheless, every teacher showed a high response rate on the importance of science education. Remarkably, the higher teachers' level of education was, there remained a higher awareness on the importance of science education.

Table 5. *The Degree of Importance for Each Goal of Science Education*

Goal	Type of Institution	It is important	It does not matter	It is not important	Total	χ^2
Growing Curiosity about Things and Phenomena	Childcare Center	95(94.1)	5(5.0)	1(1.0)	101(100)	2.450
	Kindergarten	101(98.1)	2(1.9)	0	103(100)	
Raising Scientific Attitude to Explore Surrounding Phenomena and Things	Childcare Center	87(86.1)	13(12.9)	1(1.0)	101(100)	3.223
	Kindergarten	96(93.2)	7(6.8)	0	103(100)	
Having an Interest and Understanding the Features of Tools and Machines	Childcare Center	58(57.4)	42(41.6)	1(1.0)	101(100)	5.301
	Kindergarten	74(71.8)	29(28.2)	0	103(100)	
Improving the Scientific Process Skills	Childcare Center	54(53.5)	47(46.5)	0	101(100)	16.016***
	Kindergarten	71(68.9)	25(24.3)	7(6.8)	103(100)	
Achieving Scientific Knowledge relating to Life and Experience	Childcare Center	81(80.2)	20(19.8)	0	101(100)	5.119*
	Kindergarten	94(91.3)	9(8.7)	0	103(100)	
Growing Creative and Critical Thinking	Childcare Center	76(75.2)	24(23.8)	1(1.0)	101(100)	3.936
	Kindergarten	88(85.4)	15(14.6)	0	103(100)	

*p<.05, ***p<.001

As shown in Table 5, the results of comparing the responses showed a significant difference according to the type of institution at “improving the scientific process skills” ($\chi^2=16.016$, $p=.000$), and “achieving scientific knowledge relating to life and experience” ($\chi^2=5.119$, $p=.028$). Generally, kindergarten teachers’ awareness (68.9~98.1%) for each goal of science education was higher than childcare center teachers’ (53.5~94.1%). Based on teachers’ teaching experience, awareness of importance for each goal of science education showed significant differences by each goal, but no special tendency appeared. According to the teachers’ level of education, awareness of importance for each goal of science education showed significant differences. In the case of following goals, “raising scientific attitude to explore surrounding phenomena and things” ($\chi^2=29.405$, $p=.000$), and “growing creative and critical thinking” ($\chi^2=55.668$, $p=.000$), teachers who have high level of education responded

more than the other teachers.

Table 6. *The Needs for Science Education*

Importance	Type of Institution	Development Teaching Materials	In-service Education	Create Environment	Parent Involvement	Active Participation of Children	Total	χ^2
1	Childcare Center	8(7.9)	<u>24(23.8)</u>	<u>45(44.6)</u>	6(5.9)	18(17.8)	101(100)	11.167*
	Kindergarten	13(12.6)	<u>27(26.2)</u>	<u>54(52.4)</u>	0(0)	9(8.7)	103(100)	
2	Childcare Center	26(25.7)	9(8.9)	40(39.6)	6(5.9)	20(19.8)	101(100)	4.843
	Kindergarten	24(23.3)	12(11.7)	40(38.8)	1(1)	26(25.2)	103(100)	

*p<.05

- Ordinal outcomes, Only presented to 2 rank of all 5 rank

As shown in Table 6, the results of comparing the responses showed that both institution teachers responded to the “create environment” (44.6%~52.4%) and “in-service education” (23.8%~26.2%) as the first rank. The results of verifying the difference between childcare center and kindergarten, there was a significant difference ($\chi^2=11.167$, $p=.025$). This is the result of analyzing the difference between the items that were indicated as the first rank. There were significant differences among the first rank items depending on the teachers' teaching experience ($\chi^2=53.450$, $p=.000$) and teachers' level of education ($\chi^2=94.156$, $p=.000$). Teachers with less than one year teaching experience (68.8%) and university graduates (43.9%) responded the most to “in-service education”, while the other teachers responded the most to “create environment” (36~75.8%).

As shown in Table 7, the results of comparing the responses showed that there was no significant difference depending on the type of institution. However, most teachers of both institutions responded to “teaching method” (48.5~55.3%) and “practical skill” (27.7~32.0%). There were significant differences according to teachers' teaching experience ($\chi^2=79.400$, $p=.000$) and the teachers' level of education ($\chi^2=50.847$, $p=.001$). Teachers with less than one year teaching experience responded the most to “teaching method” (81.3%), teachers with six to ten years teaching experience responded the most to “practical skill” (62.5%). Graduate school leavers responded the most to “practical skill” (63.6%), while other teachers responded the most to “teaching method” (43.5~70%).

Table 7. *Requirements for In-service Education*

Category	Theory	Plan	Selecting Contents	Environmental Composition	Teaching Method	Practical Skill	Total	χ^2
1 year Course								
Education	0	0	2(7.1)	4(14.3)	15(53.6)	7(25.0)	28(100)	
Graduation								
College	2(3.2)	0	1(1.6)	13(21.0)	27(43.5)	19(30.6)	62(100)	
Graduation								
University	1(1.2)	3(3.7)	3(3.7)	3(3.7)	51(62.2)	21(25.6)	82(100)	50.847***
Graduation								
Graduate	0	1(4.5)	0		6(27.3)	14(63.6)	22(100)	
School								
Others	0	2(20.0)	0	1(10.0)	7(70.0)	0	10(100)	

***p<.001

Conclusions & Suggestions

The conclusions are presented based on the research questions.

The Status of Science Education in Early Childhood Educational Institutions

First, in the degree of teaching materials provided, teachers of both institutions showed higher response rate to “it is lacking” than “it is sufficient.” This means that the teaching materials for the science experimental activity are not well provided enough to satisfy teachers. According to Kim (2001), teaching materials can evoke the interest of children as well as make teachers motivated, and those are basic condition for scientific activity. Therefore, teaching materials should be provided more than now. However, we need to focus on the group who responded to “teaching materials are sufficient.” They are mostly teachers with more teaching experience and higher level of education graduates as well as kindergarten teachers. This showed that teaching materials could be recognized differently by teacher’s variables. Kim (1996) reported that in the case of teachers having a low level of education, they learned more theoretical knowledge rather than practical skill at pre-teacher education. It

makes teachers use the teaching materials restrictively rather than flexibly. Therefore, it is important to prepare an appropriate plan for teacher education according to teacher's variables. Also, teacher education which includes how to use flexibly teaching materials will be more required than providing new teaching materials.

Second, in the operating status of science education, the difference according to the type of institutions was shown. Childcare center teachers mostly showed that they operate scientific activity as a free choice activity for individual children, while kindergarten teachers mostly showed that they operate scientific activity as an experimental activity for small groups. This means that childcare center teachers focus on the children's individual natural interest, on the other hand kindergarten teacher's focus on the children's cognitive development through scientific experiment. Also, teachers with more teaching experience and higher level of education graduates responded mostly to experimental activity for small group. According to Kim (1990) and Kim & Kim (2004), teachers with more teaching experience and higher level of education graduates recognize the importance of the operation based on children's natural interest, but they passively operate scientific activity through following the guide book or training source book rather than considering the children's interest. However, Lee (2006) and Martin (2003) mentioned that science education based on the Constructivism starts from the child's individual curiosity, and then makes a connection to the group experimental activity for children's cognitive development. Also, they mentioned that most teachers fail to practice this in their real field. Therefore, teacher education based on the Constructivism which considers both individual curiosity and cognitive development through interaction is required. Also, it is necessary to consider the difference according to the teacher's variables as this study results. Hence, teacher education for the teachers having a low level of education, teachers with less teaching experience, and childcare center teachers should include how to connect children's curiosity into the experimental group activity in order to develop the children's cognition. Teacher education for the teachers having a high level of education, teachers with more teaching experience, and kindergarten teachers should include how to lead children's interest before conducting experimental group activities.

Third, in the aspect of assessment about science education, all teachers of both institutions showed a high response rate on "appropriateness of child development". It is consistent with the DAP approach which is an important educational principle in the early childhood

education area. NAEYC reported that DAP approach considers all aspects of children's development; child's physical, emotional, cognitive, and social development. This focuses on integrating each development through appropriate stimulation. In addition, it emphasizes to fit with the developmental needs of individual children by recognizing individual differences on developmental stage, ability, interest, etc. (Seo, 1992). Also, in the result, kindergarten teachers and teachers with more teaching experience responded to "the selection and organization of educational activity" as an important point. This means they more consider practical teaching methods through assessing the selection and organization of educational activity than other teacher groups. Therefore, in order to improve practical science teaching ability, it is necessary to include how to assess the selecting and organizing of educational activity as the contents of teacher education, especially for childcare center teachers and teachers with less teaching experience.

Teachers' Perception on Science Education in Early Childhood Educational Institutions

First, teachers of both institutions showed a high perception on importance in science education. The Ministry of Education, Science and Technology (2010) mentioned the importance of teachers' role through emphasizing the national level science education policy. Through this point of view, the above result is desirable for quality science education in the future.

Secondly, in the perception on the importance for each goal of science education, kindergarten teachers more responded to "improving the scientific process skills" and "achieving scientific knowledge relating to life and experience" than childcare center teachers. This consists with Lee & Lee (2002), which reported that the awareness of childcare center teachers on achieving scientific knowledge and promoting the scientific process skill is lower than kindergarten teachers because they take a wider range of children than kindergarten. However, according to Koch (1999), the scientific process skill is human nature. It is frequently used to explore around the world and build knowledge, regardless of age. Therefore, the education for achieving scientific knowledge and promoting the scientific process skill must be emphasized in childcare center, too. Therefore, appropriate teacher education considering the teacher's variables is required.

Third, in the needs for science education, teachers of both institutions required in-service education. In the requirements about contents of in-service education, more than 70% of all teachers responded that they require teaching method and practical skill. This consists with Oh & Hwang (2011), who reported that teachers want to include practical activities and teaching method program in in-service teacher education for science education. Unfortunately, the result was acquired only by examination for kindergarten teachers. Therefore, in this study, it was proved that childcare center teachers also require the same contents as teacher education contents for science education. Thus, teacher education should include teaching methods and practical skills as the contents for all teachers.

According to the above conclusions, three proposals can be presented as follows:

First, teacher education must consider various teacher variables to help teachers practice science activities in their own field. Through the results shown above, the differences in perception and operation of science education according to the teacher's variables became valid. Thus, teacher education which reflects the various teacher's variables is required, not the uniform education. Therefore, it is consistent with Post-modernism which focuses on the reflection of diversity depending on each teacher's social-cultural context (Yang & Hwang, 2002).

Secondly, in order to activate science education of early childhood, a basic effort rather than extensive effort is required. For example, the indication which teaching materials for science education are lacking has existed for over 20 years, but teachers still recognize the lack of teaching materials for science education. Therefore, the solution which informs how to use the existing teaching materials in various ways is more efficient, rather than provides numerous new teaching materials for activating science education.

Finally, continuous in-service education is required. Although the child-centered science education can be conducted by adding the appropriate teaching methods on theoretical background, teachers with less teaching experience who recognize that teaching materials are absent can ignore it as just a theory. Teachers believe that it does not change in the short term because they are familiar with teacher-led instruction (Kim, 2005). Therefore, in order to change a teacher's belief, continuing teacher education should be required. Continuing teacher education can provide opportunity of reflective thinking based on the Constructivism for teachers. Therefore, this can change a teacher's belief and create quality science education for

children.

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