HOW TO TEACH AND LEARN SCIENCE IN ERALY CHILDHOOD EDUCATION? EXPLORING TEACHERS' EPISTEMOLOGICAL BELIEFS

ABSTRACT

Epistemological beliefs refer to one's beliefs about the nature of knowledge and the ways of knowing. Personal epistemological beliefs are highly related to individuals' beliefs about learning and teaching.

Children are curious and continuously try to understand the world around them. We can nourish children's natural capacity to know by offering them different and interesting science experiences and support development of their critical and creative scientific thought processes.

We conducted a case study using in-depth interviews with five early childhood teachers. The results suggest that young children rely on adults as experts to provide knowledge. In addition, teachers believe that young children's science knowledge originates outside of themselves and it may be transmitted from external authority.

We believe that a science education program would provide teachers with constructivist way of thinking and change their practices. Furture research would concentrate on the effects of a science education program on teachers epistemological beliefs and their practices regarding science education.

INTRODUCTION

The term 'epistemological beliefs' has been used widely to refer to personal beliefs about the nature of knowledge and the ways of knowing (Hofer & Pintrich, 2002). Several research related to teacher education has suggested that teachers' classroom behaviors and activities are determined by a set of theoretical frameworks which is belief driven (Clark & Peterson, 1986; Richardson, 1996).

This set of theoretical frameworks represents the teachers' conceptions about teaching and learning (Calderhead, 1996; Marland, 1995). Because of this reason, teacher candidates' or teacher educators' beliefs about the nature of knowledge and knowledge acquisition (epistemological beliefs) have taken researchers' attention. Research also show that teachers' epistemological beliefs are closely connected to their pedagogical approaches to achieve different teaching goals (Kang & Wallace, 2005). Schoenfeld (1988) reported that teachers' instructional approaches conveyed epistemological beliefs whether intended or not. As a result we can say that it is essential to understand how teachers' epistemological beliefs are related to various aspects of teaching practices (Kang, 2008).

Children are curious and continuously try to understand the world around them. We can nourish children's natural human capacity to know via offering them different and interesting science experiences (Harlan ve Rivkin, 2004). Early years are the important years to develop critical and creative scientific thought processes (Watters & Diezmann, 1998). Ünal and Akman (2006) conducted a study in Turkey and found that early childhood teachers who had information regarding science education for young children and had chance to apply this information during their college education showed positive attitude towards science education and indicated feeling comfortable during applications of science activities. Another reserach pointed out that early childhood teachers did not have sufficient material and information regarding science education for early childhood period (Karamustafaoglu & Kandaz , 2006). These results underline the needs of early childhood teachers in Turkey to be supported as information and material to improve their practices.

As a group of researcher, we planned to develop a science education program and a support system for early childhood teachers to improve their science practices with their students. To be able to reach our goal, we conducted a primary study in a child care center. In this paper we would like to share a part of our findings. We especially focus on epistemological beliefs of the participated teachers

METHOD

As a primary study, we conduct a case study with five early childhood teachers who work at one child care center placed in Ankara.

We had semi-structured interviews which composed of nearly 15 questions. All interviews were recorded by audio-recorder after optaining participants' permision. Transcriptions of the interviews are content analyzed to identify the range and intensity of beliefs about previously determined categories. Categories Three researchers done content analysis seperatly and compared their findings and created categories according to their agreement.

FINDINGS

Participated teachers' beliefs were summarized in two categories: 1) Nature of knowledge and 2) Nature of knowing.

1-) Nature of knowledge

- Young children's science knowledge develops gradually as they grow older.
- Young children's science knowledge is contextual; they need to go different places and interact with different materials
- Adults should provide materials, explanation, and talk with children.
- SES is contextual factor that shape young children's science knowledge.

2-) Nature of knowing

- Young children's science knowledge is constructed by:
    - Interaction with multiple resources
    - Use of their five senses
- Young children come to teachers to justify science knowledge

As seen in Table 1, teachers (P1, P2, and P3) who have high school graduation beliefs that children learn science via simple explanations and visual materials. However, teachers (P4 and P5) who have higher education than high

school emphasize the importance of children's curiosity to learn science (See Table 1). In addition, P4 and P5 provide children with richer science activities than the other participated teachers (See Table 2).

Participated early childhood teachers think that how to teach 2- and 3-years-old children should be different than one of the 4- to 6-years-old children. They argue that for younger children information should be given in a simple and enjoyable way. For children older than 3-years-old, more information should be provided.

CONCLUSION

The purpose of this study was to identify early childhood teachers' epistemological beliefs regarding how young children learn science. Participated teachers believe that young children rely on adults as experts to provide knowledge. In addition, teachers believe that young children's science knowledge originates outside of themselves and it may be transmitted from external authority.

The findings from this study also provide us determining what kind of science activities teachers do and what are adults' role in science learning.

These finding show that a science education program need to be planned to help teachers think in more constructivist way. Following steps of the current study, we are planning to collect data regarding participated teachers' practices in classroom.

Future study should explore how teachers' epistemological beliefs related to their practices. Furthermore, whether a science education program would change early childhood teachers' epistemological beliefs and their practices should be investigated.

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TABLES

Table 1: Participants' Educational Levels, Their Answers About "How Children Learn Science" and "How to Teach"

	Educational Level	How children learn science	How to Teach
P1	High school	• Investigations by teachers • taking children to visit some places • make sure they see things • providing materials • work with parents cooperatively	• It could be taught by using different and noticeable material every day and doing investigation
P2	High school	• Make sure children experience things • entertain and teach at the same time • demonstrative things should be provided	• Simplifying the activities • through the play, • Talking is very important so stimulating is very important.
P3	High school	• Children should be free to try what they want • use visual materials • give explanations in a simple way • practice	• For very young children, make it more fun and more demonstrative • for older children, more information and explanation such as pictures from encyclopedia
P4	Junior teachnical school	• Practicing and experiencing things • Demonstartive for children • group work • supporting children's curiosity	• Giving children opportunities to do and experience • Activities should be illustrated • Curiosity can be encouraged in the group work
P5	College	• Doing experiment and investigation • Visit different places • Doing observation • Be curious and ask questions	• For younger children, using concrete materials and explain in a simple way • For older children, giving more detail

Table 2: Participants' Answers About "The Science Activities They Do" and "The Role of Adults in Childrens' Learning"

	Science Activities	The Role of Adults
P1	• experiments • grow a plant • raising an animal • visits zoo, where plants sold and some other places	• Love children • Being investigator • Be open minded
P2	• grow plants • experiment • observation • going outside	• Talk with children and provide materials • encourage children's curiousity • know a little bit from every thing
P3	• use microscope and magnifying glass to investigate foods; • projects, • using internet, • using cards about plants	• Do some investigation, and prepare some teaching materials,
P4	• activities with leafs • making pickles • grow plants, planting • bringing an animal to class • investigating bugs via magnifying glasses • experiments	• Supporting children's development via activities • supporting creativity • Giving information before try something
P5	• projects are important • visits and observations • experiment • growing plants • raising animal • doing albums and collections	• Providing opportunities with which children can practice and experience • Providing opportunity education • Demonstrating