Mapping Problem-Solving in Early Childhood Education through Problems Involving Construction.

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Abstract

The data presented in this poster was collected as part of a research project aiming to develop a joint mathematics and science literacy curriculum for early childhood education comprising of six common learning axes (experiences, scientific thinking skills, scientific thinking processes, attitudes, conceptual understanding, and epistemological awareness). The curriculum is scientifically justified through data collection and analysis from the implementation of activities, designed by a mixed group of researchers and teachers. In this poster we present data concerning the involvement of children in problem-solving in an effort to map the components of and describe what problem-solving might look like in early childhood education settings.

The data (videotaped incidences, teacher field notes, children's records) was collected from a class of 20 4 year-olds of a Cyprus urban preschool setting, through the children's involvement in a problem-based mathematics learning centre during free play. In this poster we will present the analysis of the data which resulted from the children's attempt to solve two construction problems. The first problem was the Pentomino Problem. The children were asked to find how many different shapes could be constructed with the use of 5 congruent squares, connected along their edges with the use of 5 identical plastic squares. The second problem was the "net of the cube' problem. The children were asked to find different ways to connect 6 squares in order to produce a cube and were given 6 squares from a geometry kit used for building 3D shapes with a very easy clip connection. The children were also given squared paper to record their solutions.

The data analysis allowed us to trace how problem solving can be interconnected with other learning axes (experiences, skills, other processes, attitudes, conceptual understanding, and epistemological awareness) and identify children's strategies. Among the children's strategies we identified examples of mechanistic reasoning (the children after observing constructions which did not allow them to construct a net, tried to explain why these solutions were not correct thus making a hypothesis which led them to correct solutions) and analogical thinking (used analogies in relation to how they had solved other problems in the past). Overall the findings support the point that involvement in construction tasks gives (young) children access to powerful ideas and allows them to exhibit their ability for more sophisticated forms of thinking.

Keywords:

Problem solving, early childhood education, construction problems