Developing children's understanding in Astronomy

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Abstract

Elementary children's notions and ideas about astronomical phenomena is a topic that has concerned many researchers. Previous research demonstrates that children's ideas are similar with the ideas that scientists held at various points in the history of science (Baxter, 1991). Despite well-documented public interest in astronomy, Finegold and Pundak (1991) observe that only in few countries is astronomy taught as a distinct topic in the science curriculum since curriculum developers consider it to be impractical and not useful. However, recently in the US and in the UK there is renewed effort to teach astronomy from the first grades of the primary school (Project Star, The earth's place in the Universe, Mant, J.A.,1993). In Cyprus, astronomy and, specifically, topics such as phases of the moon, the day/night cycle and the planets are taught in the 6^{th} grade in the context of geography classes.

This paper reports on an action research study carried out in a primary school in Cyprus about children's understanding in Astronomy during spring 2000. The purpose of this research was to develop teaching material that would help 12-year-old students understand basic astronomical phenomena such as the day/night cycle and the moon phases. The teaching material consisted of four different units: a) Measuring angles, b) Light and shadow/ Making Shadow plots, c) Day/night cycle and d) Moon phase formation. The teaching materials follow an inquiry oriented approach. The sample consisted of fifteen 12-year-old students of an urban school in Cyprus.

Specially designed pre tests and posts tests were administered to students both before and after teaching and the responses in pre-test and post-test were analyzed using a phenomenographic approach. Analysis of the results indicated that the curriculum developed was effective in many aspects. Firstly, most of the children were able to develop an operational definition of the concept of angle and to construct scientific models about shadows and the day/night cycle. A second point is that the student participants developed skills such as: working with peers, explaining their reasoning and using operational definitions. Also, as discussions with students verify, most of the students were able to develop spatial representation skills.

The results of our research indicate that a) 12-year old students in Cyprus hold the same notions as children in other countries, (b) basic astronomical concepts can be taught to elementary school students, (c) inquiry can help students construct scientific models and develop thinking and reasoning skills.