

Nikolaos Fotou

The day/night cycle and the alteration of seasons. Greek primary school children's conceptions

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Introduction

In the last forty years, research in science education has focused on investigating students' ingenuous and intuitive views across a wide range of scientific domains and ages. The majority of these studies have reported that children form ideas about several physical phenomena at a very early age, before receiving any formal education. These naive views and meanings are initially formed from events that children experience and observe every day in the natural world (Baxter, 1989). As Driver and others (2000) pointed out, these ideas usually go against the scientific views and are in conflict with them. Those kinds of students' perspectives are known as alternative conceptions, preconceptions, alternative frameworks and misconceptions (Wandersee et al., 1994).

Research in this domain has, also, offered explanations about the origin of these naive ideas. These explanations could be broadly categorized into two theoretical groups. The first one refers to the Piagetian notion of learning while the other derives from a Vygotskian perspective. Several books have been written regarding differences between Piaget's points of view about learning and Vygotsky's ideas. However, as Sjöberg (2007) pointed out, they both can be seen as constructivists. In agreement with this statement, Pass (2004) noted that the two perspectives offer different paths on the way to constructivism. Vygotsky has placed greater emphasis in the social and cultural factors, whereas Piaget believed that knowledge is constructed from experiences as the individual gradually grows and develops. Thus, for the latter constructivist view of learning is the result of natural and spontaneous knowledge (personal constructivism, Piaget, 1960), while the former perceives it as a social interaction (Sjöberg, 2007). The majority of studies have been based on these two theories of learning. In the present study, these two viewpoints are adopted. According to these approaches, individuals construct their own ideas and understandings from inputs which have as a result the form of a wide range of conceptions. As Vosniadou and Brewer (1987) argued, knowledge is acquired and restructured when naive ideas encounter dissimilar and, in some cases, competing views. Students usually confront such conflict situations in their everyday life when observing nature and discussing with their peers or when asked to deal with different ideas in classroom settings.

The area of elementary cosmology seems to a fruitful and attractive domain in order to investigate how young students combine practical observation of their own world with views that they have been taught, cultural artifacts and information, developing this way their ideas.

Generally speaking, astronomical notions have a great cultural and educational importance. As the well known French physicist, *Henri Poincaré*, has stated, cosmology could offer a “cosmic perspective” and show us “how small our bodies, how large our minds” actually are. Along this line, Millar (1996) argued that simple cosmological concepts, like the alteration of day and night or seasons cycle, is a topic that everyone should be able to understand because it is valued as knowledge produced in our society. Even if models of the solar system and relative phenomena do not have practical function in everyday life, they should be conceptualized as part of social achievements.

Based upon the didactic reasons mentioned above, this topic has been in national curricula in many countries. In some countries there is a separate lesson in science that deals with astronomical phenomena, for instance in England, whereas in other countries (for example, in south Africa) cosmological notions are traditionally “geographic” topics. According to the national primary curriculum in Greece, children at the 1st, 2nd and 6th grade are taught topics related to astronomy (e.g. orbit and spinning of the earth round the sun and its axis, respectively), the natural surroundings and conditions where animal, plants (e.g. changes in plants according the season of the year) and people live in (e.g. how people’s routine change according to the different seasons during a year) in the lesson of geography.

In this area of natural sciences, students, based upon their daily experiences, develop their own models and understandings about season cycle and day/night alteration. The latter arise from physical senses, cultural background, discussions with their parents, peers interaction, language experiences, information from media and formal teaching (Duit and Treagust, 1995). Thus, the aim of the present study is to examine the ideas children hold about day/night and season cycles as well as the extent to which these two phenomena are understood in the last two stages of primary education. Also, the research examines the differences between fifth and sixth grade students’ conceptualization of the concepts about these two cycles. In the next section, previous researches about young children’s explanations about day and night cycle and seasons alteration are reviewed.