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RESEARCH ARTICLE

IDENTIFYING PERCEPTION OF ELEMENTARY STUDENTS RELATED TO EARTH, SUN AND MOON

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ABSTRACT

The study reports data on preconception of elementary students from India related to Earth, Sun and Moon. The students' preconceptions were identified utilizing informal interview with 32 students. The three aspects related to shape, motion and location of sun, earth and moon were investigated during interview. The findings revealed that how difficult it would be the transition for students to reach at the scientific level of understanding with identified preconceptions acting as constraint. This study has implications for teacher training in future, in instruction and design of curriculum in astronomy education to fill the existing gap.

INTRODUCTION

The various researches have been done in finding the development of knowledge of astronomy in children. To understand the physical world children tried to construct an initial understanding based on the experience which they have on everyday basis. As the time progresses, children are confronted with various cultural theories of physical world and finds difficulty in reconstructing their basic beliefs according to the latest information taken into consideration. This approach is supported by various studies on beliefs about the physical world (Mc Kloskey & Kargon, 1988, Wiser, 1988). Vosniadou & Brewer, 1992, 1998 researched on American children's knowledge of astronomy and it is consistent with the approach of acquisition of knowledge just outlined. Cary & Spelke (1994) also suggested in their studies that conceptual development comparisons in cross cultural area provides information to theories of domain specific change by giving relevant data on the culture specific aspects of representatives of children knowledge, which in result can help in identifying the nature of obstacles that governs conceptual development in various domains. Nussbaum, 1979, Nussbaum & Novak, 1976, Sneider & Pulos 1983 studied children's knowledge of astronomical aspect in both western and non western setting. Vosnaidou & Brewer (1992, 1994) found out two beliefs that were constraining the young children's initial models of earth's shape. It is very complicated in countries in Greece and India where indigenous cosmologies are interfering with the understanding of scientific model. The scientific model is presented to children in their formal instruction in classroom and which they eventually acquire also but in United States, the only prevalent cultural model is the scientific model. The only prevalent alternative concept are of pre Copernican in American culture where as mythology embodying the indigenous cosmologies was prevalent in culture of Greece and India. All the mythologies talks about the partition of the egg shaped universe divided into sky, earth and other worlds, below and above the earth. The children only tries to assimilate those aspects of indigenous cosmologies that are close to their daily experiences and are not in contradiction with their empirical knowledge.

Methodology

This study involved students 32 students out of which 16 are female and 16 are male students of VIIIth standard from two different schools in Delhi ranging in age from 12 to 14 years.

Materials

The informal interview was utilized to know the preconceptions of students about celestial objects (sun, earth and moon). The focus of question asked in interview were on following aspect (1) shape of earth, moon and sun.(2) the motion of sun, earth and moon (3) initial ideas about relative location of sun, earth and moon. The targeted themes were tested with several questions. Some of the questions asked required verbal response only where as other required pen-paper for drawing and various size object to explain the verbal response by the children. The gestures made by students while giving response were also taken into practice to reflect into the beliefs made by students.

Procedure

The children were tested through focused group interview. The students were divided into group of four. An average interview lasted about 30 minutes. The children were given the option of answering in Hindi. The responses from children were written down by the interviewers and also recorded for later transcriptions. In order to test whether the response on any given question was ambiguous or inconsistent the follow up questions were also asked.

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Findings

The shape of sun, earth and moon

Six questions were asked to examine the children beliefs about the shape of sun, earth and moon. Based on their responses to these questions, children were placed into various categories. While having a close look at the data we found that a majority of the children (59%) responded that shape of earth was like circle whereas (15%) responded that earth was flat like plate from upper portion and round from lower i.e. truncated hollow sphere. (25%) of children responded that shape of earth was a sphere and we were residing in the middle portion of it rest in (1%) different views like shape was like a ring and oval like an egg. Almost all the children straight away said that the shape of sun was like a hot ball in which something was burning inside. regarding the shape of moon majority of children responded that (89%) moon was flat like a plate as we have always seen it like this in the sky every night and rest (11%) told that it was half circle in actual but we were able to see different shape because of covering of it with clouds and some other objects floating in the sky. When children were asked to place human being on earth, some placed it inside the earth, some on the middle portion; few placed it on the bound on the ring. The students were confused when further probed about spherical shape of earth though it appears flat to us. The main reasons given by the students were soil deposition, few said due to vegetation on the surface it appears flat but could not relate the distance and curvature.

Motion of sun, earth and moon

The questions related to motion of sun, earth and moon were asked. The majority of children (90%) responded that earth was revolving around sun but were not sure of rotation of earth around its axis. The children were further probed by asking how days and nights are formed. The majority of children replied that it was because of sun rising and setting and it's the movement of sun that caused day and night. The responses about the motion of sun were same by majority of children (99%) said sun was stationary and earth revolves around it but it was contradictory to the response given for day and night formation. Rest (1%) was confused and responded sun was also moving. In the question related to the motion of moon, (70%) responded that moon was also moving around the earth that is why we was able to see different shapes of it from earth. Rest 30% said it was not moving around the earth but earth was rotating and position of moon was fixed.

Location of sun, moon and earth

When questions were asked about the position of sun, earth and moon only 40% responded correctly saying sun was stationary and located at the centre while the earth was revolving around the sun, and moon revolving around the earth. 30% children responded that sun was at the centre and earth is revolving around the sun and moon was separately placed near to earth and has nothing to do with sun. 20% children responded that sun was at the one end and earth was at the other end where as moon was in between and closer to earth. 10% children said earth and moon separately revolved around the moon.

CONCLUSIONS

This study identified the preconception of elementary students related to earth, sun and moon.

Young children initial concepts were very much different from the scientific one. The identified preconception held by students act as a constraint and gave rise to synthetic understanding. When students were exposed to scientific understanding about sun, moon and earth in the formal setting in classrooms, students tried to assimilate this information with their previous understanding of concepts. How they would restructure their understanding to eventually acquire scientific understanding required to be traced in order to fill the existing gap and inconsistencies in understanding the concept.

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