Alternative Conceptions of Children about Food

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Abstract- *The main objective of the study was to know about children's alternative conception about food, its need and its function, components of food, concept of balanced diet and the concept of getting energy from food. The purpose of this investigation was to understand logics and reasoning children apply to explain their ideas; so as to discover whether there is any relation between the way children's conception develop and the way historically scientific ideas evolved. 30 children of 8 to 10 years of age were given different tasks including several possible alternative conceptions about food such as activities based on food, discussion among groups, questionnaire. Qualitative analysis of the data revealed alternative conceptions children hold about food. Data from the study bring out that holding of alternative conception of children related to food is widespread. Children hold several alternative conceptions such as: from all types of food they get energy, food is something that is eaten only, consumption of anything even water would lead to weight gain, proteins are most essential nutrient for the body, animals need food but not nutrients and vitamins, plants do not need food because they can't eat. Children also have several conceptions that are incomplete or they don't know the reason behind them such as 'vitamin pills' are good for body but don't know why. It was analyzed that many concepts held by children show resemblance with those held by scientists in the past which show that children base their conceptions on some logics and reasoning. Implication of the study can be that the teachers should give space to children's alternative conceptions in the class and try to build upon it through hands on activities and visual aids.*

Keywords: Alternative, Conceptions, Consumption, Food, Energy.

Introduction

Children when enter school, carry a bunch of ideas about workings of the world. Their concepts and explanations about these worldly phenomena are rooted in their everyday experiences. When teachers provide instructions on various concepts in school they are teaching students who already have some pre-instructional knowledge about the topic.

Children quite naturally form the ideas but not all these developed ideas are in coherence with the most current evidences and scholarship in a given discipline. As for Science, it is often in conflict with our common sense view of looking at the world, it sometimes doesn't make sense (Cross and Peet, 1997). Originally, children were thought to misunderstand science but more recent researches suggest that they have an alternate framework and their reasoning is quite logical. These concepts developed by alternative framework of thinking are termed as "alternative conceptions" or "preconceptions".

Alternative conceptions can hinder learning because these are deeply entrenched in students' thinking and very resistant to change. If not changed, students' will keep interpreting fresh experiences with these erroneous perceptions. Hence, conceptual change has to happen for learning to happen. Driveret al. (1996) defined conceptual change as a process of learning that involves making changes in students' knowledge. Learning shall entail reorganizing or replacing existing knowledge.

Piaget explains that two interrelated processes take place during concept formationorganisation and adaptation. People make logical connections between ideas and organise them. He defines adaptation by using two other terms-assimilation and accommodation. Assimilation happens when an individual act on the environment and incorporates the new concept that emerges as the result of his action into the current ones. But if the new concept does not fit into his present way of thinking the person experiences a state of disequilibrium. To resolve this conflict, the person adjusts existing ideas or creates new ones to accommodate new experiences. After accommodation, individual reach equilibrium which is the final stage of adjustment of concepts.

Russian psychologist Lev Vygotsky argues that children learn concepts based on the actual development levels rather than chronological age level. One of the most important construct in his theory is that of the Zone of proximal development (ZPD). He defines ZPD as the distance between the most difficult task a child can do by himself and the most difficult task a child can do with other people's help.

He argues that if one wants to teach a new concept that does not match with the actual development of the child, the child will not be able to learn or understand that particular concept unless he has extra assistance from adults or peers. However, he may easily grasp the same concept a year later without any help. Vygotsky uses the term scaffolding to describe the assistance a teacher, peer or any adult gives to the child in learning new concepts and forming his understanding by giving supporting information.

Objectives

1. To understand the emergence of alternative conceptions in children.
2. To know about several alternative conceptions children hold about food.
3. To explore the logics and reasons children apply to support their conceptions.
4. To observe and study how these ideas are made part of classroom discourse.

Methods and procedure

Sample Size- 30 students of class 4th in an MCD school of South Delhi
Age group- 8-10 years
Sampling Technique- Convenient sampling

Tools- Observation - the teaching learning process held in regular classroom was observed to see how much space is given to share children views and concepts related to scientific ideas in class. It was observed that the class began in interactive way, teacher asking questions from students. However, the dialogue as it proceeds further indicates that the teacher did not quite build upon the responses of students. She divided the lesson in 4 themes- what is food, why we need it, components of food, and process of digestion. Overall the classes went in a teacher dominated manner.

Different activities were done with students for the purpose of data collections.

1. A Focus Group Discussion done with students in group of 10. The questions of Focus Group Discussion mainly tried to explore their conceptions about:
    - What is food? Does everything we can eat is food?
    - From where do we get food?
    - Why do we need food?
    - What does term 'Energy' mean to you?
    - Do plants and animals also need food? If yes, from where do they get it?
    - What happens to food in our body?
    - What happens to water in our body?
    - What kind of food we should eat?
    - How blood is made in our body?

2. Children were divided in groups of 5-6 members in each and given few categorizations tasks-
    - Select the food items that you think are eatable- chhole, roti, pasta, vada paav, hotdog, tea, iromba, fish, cake, chocolate, gulab jamun, snake, lotus stem, grass, rat, haldi, frog.
    - Divide the given food items in categories of your choice- coke, daal, chowmein, pakoda, kulfi, chilli potato, sambar, idli, palak (spinach), arbi, egg, halwa, meat, milk, karela (bittergourd), pizza, fish, momos, bajra roti, cotton candy, imli, gobi sabzi, kheer.

3. Some fun activities were given to students with follow up discussion-
    - **My Healthy Plate:** Children were divided in group of 4 members each. Each group was provided with a paper plate and pictures of few food items. They were told to select and paste pictures of food items that are healthy for us in one half of the plate and pictures of unhealthy food items in other half of the plate. Further, they were asked to give reasons for their selection, nutrients they get from food items they placed in two categories and other probing questions.
    - **Path of Food:** This activity was designed to know children's conception about consumption and processing of food in our digestive track. Each student was told

to draw the path of the food through their body (i.e. the digestive tract). A collective follows up discussion included questions such as what happens to the food in mouth, why is it suggested to chew the food properly, in what form food reaches stomach, what happens to food in the stomach, where does it go after stomach, how and why are fecal matters formed etc.

- **Which part of plant do we eat:** In pairs, children were provided with pictures of some items we get from plants such as potato, spinach, pineapple, onion, guava, carrot, apple, maize, rajma, sugarcane etc. and were asked to write which part of plant are these?

Findings

The various exercises revealed that children hold several misconceptions about food. They understand food as something that can be eaten and which give us energy to survive. If something is giving us energy, then it is food. Their idea of 'energy' was also vague. Many equate energy with nourishment. Most of them explained that human beings need energy to survive, work, walk, grow and animals need energy to hunt food; plants neither need energy nor food. They reasoned that plants prepare their food to ultimately provide that food to us. Many children think that there are many types of glucose, one which is prepared by plants, one we and athletes drink for sports and one whose drips are given to patients at hospitals. Almost everyone said that we don't get energy from junk food. Most children knew that we get food majorly from plants, animals but they were not aware about other sources like seafood, food we get from microbes etc. Few vegetarian children argued that chicken, meat and fish etc. are not food, we deliberately eat them. All the children marked hotdog, lotus stem, snake, frog, iromba, grass, rat as non-eatables.

For them, amount of food consumption (even consumption of water) is directly proportional to weight gain. They differentiate healthy and unhealthy food as good and bad food respectively. Many children hold the view that everything that is cooked at home is healthy. Some even believed that in outside food materials, chemicals are mixed and home cooked foods are natural. They seemed to be less aware about nutrients found in food. Their general belief was that proteins are good and fats are bad. They don't know why they are given vitamin pills at school.

During categorization tasks, Children used parameters other than given in traditional school textbooks and taught by teacher. They made categories such as like-dislike, drinkables, eatables, cooked-uncooked. Almost half of the students seemed to believe that most of the foods that are non-Indian such as burger, pizza, chowmein, momos are Chinese. Few students have striking believes like chewing gums are made up of animal skin, junk foods contain plastic.

The activity 'which part of plant do we eat' showed that children believe most of the vegetables/cereals are stem and few vegetables such as potato, carrot, radish are roots as they are underground part of plants. The diagram they drew in 'path of food' and follow up discussion

reveals that children do not know much about process of digestion. They have assumptions like good food digest in stomach and bad food comes out of the body. Few said that in stomach food revolves like mixer and thus mixed with water. Few said that stomach has two intestines. Good food goes to large intestine and bad food goes to small intestine.

They even explained that good food makes pure blood (that is red blood) and bad food makes impure blood (blue/green blood).

Discussion

It is true that the role of an EVS teacher is to bring the child to the scientific explanations of the concept but it has to be done by forming connections between the personalized contextual thought of students and the scientific universal thought. Most of the children (that is the sample of this study) come from lower socio-economic background. The observations reveal that conceptions of these children are not considered as the legitimate source of knowledge and are thus overpowered by the scientific explanations of the teacher. This authority leaves child's thoughts unaltered and unbuilt, which can further lead to the alienation of the child from the subject. Vygotsky also argued that learning happens best in connection with the social context of child. The logics and reasons children provide to support their answers prove their developed cognitive structures, how they make logical connections between ideas as Piaget said.

Alternative conceptions are difficult to challenge as they often center on aspects for which the common and the scientific use of language differs greatly. For instance, the scientific use of terms such as 'energy, digestion, consumption' is distinctly different from the language use of these terms. The language of science being highly objective, neutral, written in 3rd person connotation makes scientific texts feeling less and alienated from children's heart. Although, NCERT EVS textbooks are very well designed from a child centered perspective, including many activities, giving space to children knowledge, written even in 1st person and 2nd person connotations trying to communicate with children, still teachers are unable to bring the vision of NCF 2005 and EVS textbooks in their pedagogical practices.

Conclusion

Many theorists believe in children being active during their learning process. Learning here does not mean Formal School learning but learning that happens all the time by being engrossed in an environment. This learning starts happening long before children join school. It is intuitive to children. Alternative concepts are the result of this learning that happen by being absorbed in the surrounding & actively making sense of it.

It has been found that students' self-developed concepts about food come from the environment outside school. These ideas often do not match scientific concepts. Their conjectures that have come through observation are their most intelligent ideas of the world. They have experiences of what happen when they react to anything and what is the afterward consequence and in this way they learn a lot of things from world

Children have ways of constructing events and phenomena which are coherent and fit with their domain of experience yet which may differ substantially from the scientific view.

It's only normal of school education to come in conflict with alternative conceptions of children. However, problem arises when schools do not recognize the knowledge of students and leave students baffled and disoriented about basic concepts as food that students have direct experience with in their day to day life as opposed to more abstract concept as universe or stars. As also has been noted during observation teachers tend to perceive students' concept as irrelevant and pernicious to class discipline. Even if students' ideas come in class teachers don't know how to cater them.

Alternative conceptions are at times similar to the views scientists held at a time when the physical world was being explored. It would not be wrong to consider this as an important stage in the process of developing scientific thought for children as well.

Educational implications

4. Teachers before plunging on to textbook chapter and bookish knowledge should check students' knowledge about the topic. The scientifically incorrect previous knowledge or alternative conception even though not entirely accurate can provide the basis for building the concept. Larkin (2012) says that it may seem misconceptions are only barrier to learning, when used properly they could serve a purpose in the classroom.
5. Teachers should use various activities and methods to facilitate student learning of concept. Activities should be diverse that challenge multiple assumptions rather than larger in number that challenge few assumptions. Diverse activities and methods would help students "self-repair" their misconceptions.
6. Teacher training programs should enable teachers with skills and knowledge that help them plan activities and methods accordingly. In-service training and workshops on Students' alternative concepts can also prove to be of benefit.
7. Schools should address and assess student's preconceptions and present students with experiences that cause cognitive conflict (disequilibrium) in their mind. Schools and teachers should also guide students to resolve this conflict.
8. It is suggested that science curriculum should be designed in a way that textbooks should contain activities and discussions that evoke students' knowledge about the topic before introducing a new concept. Textbooks as well as teachers must take care about the Linguistic aspect, diagrams and pictures so that they do not develop additional alternative concepts.

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