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An Analysis of Misconceptions in General Science at Elementary Level

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Abstract: Misconceptions are barrier to students in learning general science. Some topics in general science always giving misconceptions to students and there have been many kinds of diagnostic assessment used by researcher to identify students misconceptions in general science. This study was intended to overview of common topics that students usually get misconceptions in general science. This article entitled "an analysis. of misconceptions in general science at elementary level " was carried out with the aim of determining prevalent or dominant misconceptions in science among elementary level students. The main objectives of this study was to analyzed the misconceptions of 8th grade students about concepts related to biotechnology, and sources of heat and energy. Researcher was used quantitative descriptive research design for the research. The population of the study was all the elementary schools from Dera Ghazi Khan City. Purposive sampling technique was used to select the schools from the defined population. The sample of the study will be comprised on 120 students (public sectors) of 8th grade students. Self developed questionnaire was used in order to analyze of misconceptions in General science. The highest number of students with misconception was found in topics related sources of heat and energy followed by topics of biotechnology. Most of the students had chosen their source of answer from their own intrinsic knowledge. Furthermore, it examined whether the number of students having misconception in those questions. Science teachers in designing classroom activities and teaching strategies that could address the students' misconception can use the findings of this study. It was provide some suggestions to the educational practitioners to adopt new strategies to avoid misconceptions and increase the probability of high achievement of students.

Keywords: Misconceptions, General science, Elementary level.

1. Introduction

A viewpoint that is erroneous due to poor thinking or comprehension is called a misconception. In other words, a misunderstanding is an error in judgement or wrong information that leads to a misleading conclusion. Frequently held beliefs about science that are unsupported by scientific evidence are called misconceptions in science education. Preconceived notions based on study are another example of misconceptions in science. Jean Piaget believed that science built on the experience of someone who has past and then it is reconstructed with new knowledge that he got (Jannah, 2010).

Every individual has its own experience when it compare with experience of other individuals. When someone understand new concept they knowledge will recall similar knowledge already stored in its memory. The mere complete the information constructed in one's concept that understand, the more understanding of a person in understanding a more complex event. Concepts are ideas, objects, or events that assist us in comprehending the world around us. Preconceived notions, nonscientific beliefs, naive theories, mixed conceptions, or conceptualism, on the other hand, can be defined as ideas that provide an incorrect understanding of such ideas, objects, or events that are constructed based on a person's experience, such as preconceived notions, nonscientific beliefs, naive theories, mixed conceptions, or conceptualism. Learning science at elementary level is more focused in the cultivation of basic concepts. Basic concepts are helpful for students to develop their knowledge on a higher level of thinking. Science learning will give birth to technologies that can provide convenience for life. If learner have misconceptions so they would not obtained benefits.

Learning at elementary level is in the concrete operational stage. Abstract concepts in science teaching elementary school learning would make it difficult to understand the material being studied. Based on the theory suggested by adherents to understand constructivism. Narjaikaew (2013) states if the students failed in the past to construct his experience with the new concept contained in general science learning, the learner may be subject to misconceptions. A preconceived assumption or a conceptual misunderstanding about science might be referred to as a misconception about science. What a person knows and believes contradicts what is scientifically correct in these situations. Many people who have misconceptions about science are unaware that their beliefs are wrong or inaccurate. When they are told they are incorrect, they typically have a difficult time accepting it. Students can get concepts in two ways concept formation and concept assimilation. The formation of concept students can be adopt before entering school and concept assimilation is get after entering school. Perceptions of students are easily revamped and when students are taught the real concept, then preconceived perceptions will be lost and with the help of understanding scientists have believe. First difficulty in learning general science is due to misconceptions and the concept that science is difficult.

Misconception can occur if the process of assimilation before acquiring learning with the knowledge acquired by students in the classroom cannot be incorporated. Misconceptions are frequently prop up by reasonably strong student of mind that is difficult to change and difficult to fix. Some students cannot understand ideas in class. Even some students give the right answer but only with the help of memorization. When question more deeply those students reveal their failure to understand fully concepts.

Misconceptions rise from the fact that the students build the concepts in their mind in a way that is right to their own understanding and if we describe misconception in a simple way; it is the concepts that are scientifically inaccurate but understood by students in their own way (Bahar, 2003; Ebenezer & Fraser, 2001).

The learning of students can be seriously impacted by misconceptions. These common fallacies prevent students from understanding increasingly complex ideas, and as they continue to gain information, it gets harder to correct the misconceptions. They may struggle to understand new ideas and information offered in class if their initial understanding is not activated, or they may learn them for test-taking purposes only to fall back on their preconceived notions outside of the classroom (Donovan, et al., 1999). The scientific instructor must then create a strategy for recognizing and properly addressing the misconceptions that students bring to class. Therefore, this study entitled "An Analysis of Common Misconception In General Science at Elementary Level" aimed to find out the common misconceptions of grade 8TH students in Science while comparing it with the sources of misconceptions.

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2. Method

The study is based on quantitative research design with the use of descriptive statistics using the data obtained from the set of conceptual questions. The sources of data were collected from the students of grade viii using different sets of conceptual questions which students had to answer with appropriate source of their knowledge from the given options so that the sources of misunderstanding is understood clearly. The study was intended to find out the common misconception among grade 8th student of Dera Ghazi Khan city. The population of the study was all the elementary school in Dera Ghazi Khan city where Science text book has been used for teaching material for teaching science. The sample of the study was three government schools of Dera Ghazi Khan city which was selected by purposive sampling. The lists of the students from the selected schools were selected by simple random sampling method. The tool used in this study for identifying the misconception was through the test. A set of 10 conceptual questions were given to the students where student had to give reasons to identify their source of knowledge, with their answers. Each item of the misconception test consisted of

- Multiple-choice question with common or suspected misconceptions used as the distracters of the question so that the misconceptions could in some sense be summarized.

- Multiple-choice reasons to identify the source of misconception which required students to give their reasons for the answer which they had chosen in order to analyze their misconceptions.

The collected data were coded and descriptive, logical and statistical devices with the use of SPSS 20 software analyzed them. Misconception in science and sources of misconception were analyzed according to students' responses with the use of percentage.

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3. Findings and Discussions

In this research study, there were 120 students selected for the research study for the purpose finding out some common misconception in general science. Among them, 40 students were selected from each school.

Misconceptions were constructed from chapter 1and 9 of Grade viii Science text book. There were 5 items for each CHP biotechnology and sources and effects of heat energy

Graphical representation of misconception and correct concept in biotechnology

Among 120 students, 26% students had misconception in biotechnology and the remaining 74% students had a correct concept of science in biotechnology, 13.3% students had misconception in question 1 while 86.7% students had a correct concept. Likewise, 21.7%students had a misconception in question 2 and 3 and the remaining 78.3 students had a correct concept. Similarly 49.2% students had misconception in question 4 while 50.8% students had a correct concept. In question 5 24.2% students had misconception and the remaining 75.8% students had correct concept. The detail of these data is shown in the following bar-graph.

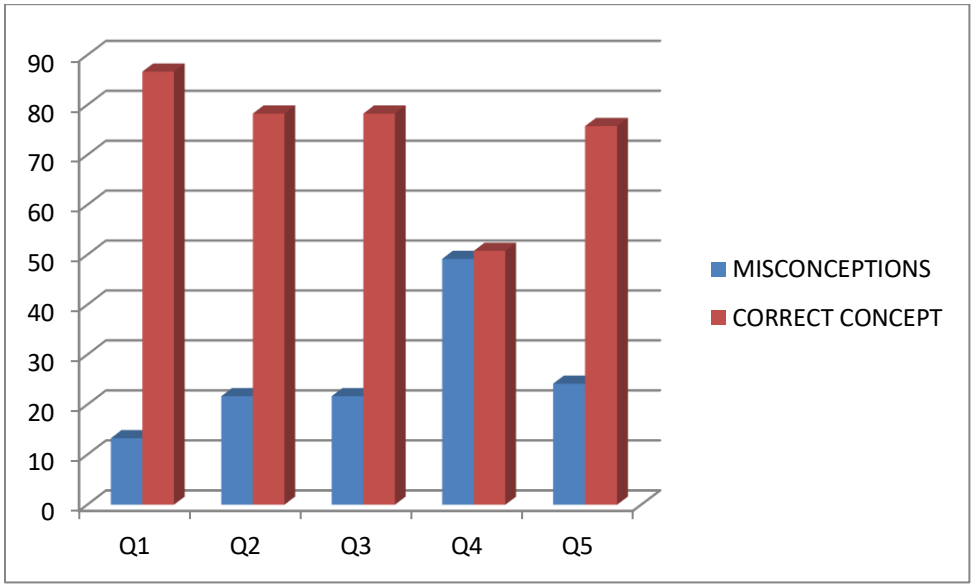

Figure 1bar diagram of Students with correct concepts and misconceptions in biotechnology

Graphical representation of misconception and correct concept in sources and effects of heat energy

Among 120 students, 37.84% students had misconception, the remaining 62.16% students had a correct concept of science in sources, and effects of heat energy, 25% students had misconception in item 6 while 75% students had a correct concept. Likewise, 37.5% students had a misconception in item 7 and the remaining 62.5% students had a correct concept. In item 8 54.2 % students had misconception and 45.8% students had correct concept. Similarly 39.2% students had misconception in item 9 while 60.8% students

had a correct concept. In the last item 33.3% students had misconception and remaining 66.7% students had correct concept. The detail of these data is shown in the following bar-graph

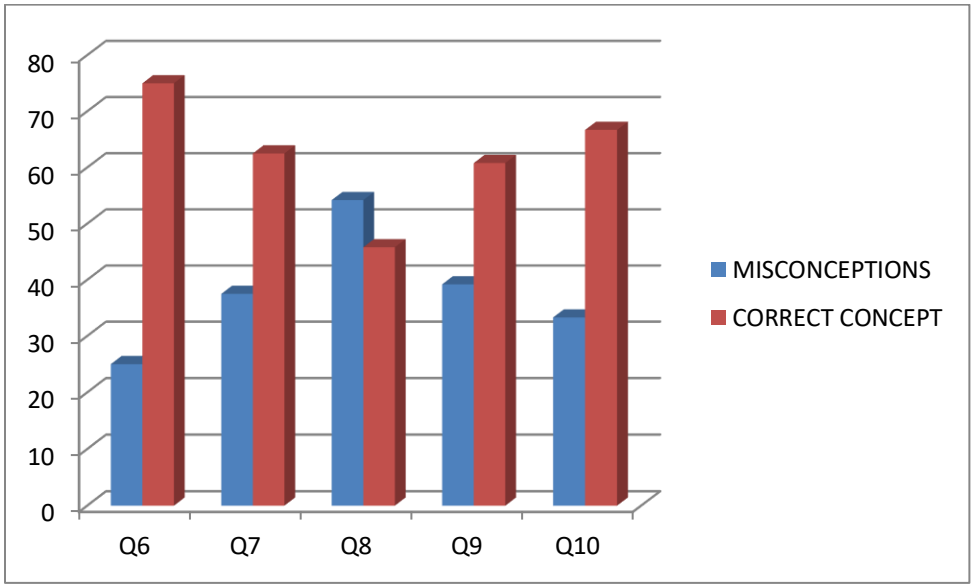

Figure 2bar diagram of Students with correct concepts and misconceptions in sources and effects of heat energy.

Possible sources of misconceptions

Students were provided with 5 different options to find their source of misconceptions. Students had to choose from those options about how they learned the answer, which developed misconception among students. If they learned the answer from teacher they had to tick the first option. If they had learned the answer from book or other related sources, they had to tick the option second. Similarly, if they had intrinsic knowledge about the answer, they had to tick the option third. However if they did not know the answer and had no source of knowledge at all, then they had to tick the option fourth. The fifth option was for those sources, which could not be addressed by the above sources. There was a blank given for this option so that they could mention their source. However, no one has mentioned any other source then given. The following graphs show a detailed analysis of sources of misconceptions in chapter of biotechnology, cell division, human organism and sources and effects of heat and energy.

Sources of misconception in biotechnology

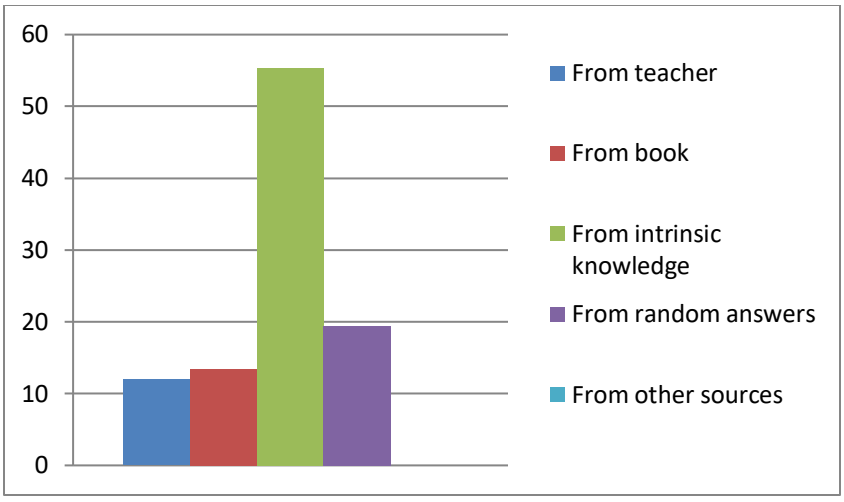

Figure 3 Sources of misconception in biotechnology.

Figure-3 shows the sources of misconception in biotechnology according to students' response. In chp 3 Most of the students (55.28%) had chosen their source of misconception to be from their intrinsic knowledge. It is obvious because biology is a subject which students can relate with their life experiences. It is much more systematic in their reasoning for agreeing or disagreeing with the ideas hence biology education itself is reinforcing these intuitive ways of thinking. The least chosen source of misconception (11.98%) was found to be from teachers. The greatest number of students having misconception in biotechnology was found to be the question about the enzymes. Most of the students had chosen their source of misconception for this question to be from their own intrinsic knowledge. This proves that students had more misconceptions from their own intrinsic knowledge rather than from teacher and books.

Sources of misconception in sources and effects of heat and energy

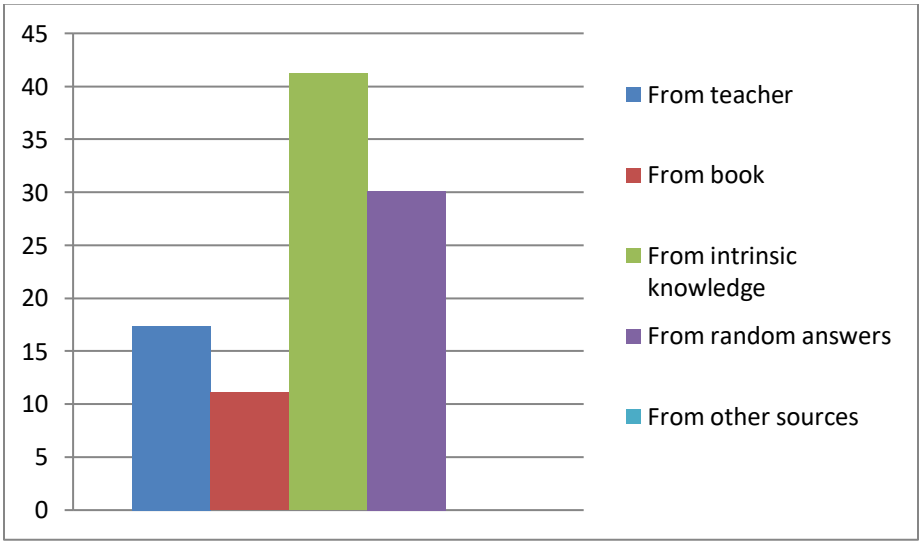

Figure 4 Sources of misconception in sources of heat and energy.

Figure-4 shows the sources of misconception in sources of heat and energy. Among the 5 options given to find the source of misconception, (41.2%) of the students with misconception in sources of heat and energy, had chosen the third option. Most of the student's source of falsified concept in heat and energy was from their own intrinsic knowledge, which they assume to be right. They have some kind of deeply rooted thinking in their mind for every concepts and it is very hard to replace with the correct scientific knowledge. In average, the least chosen source of misconception was from the teacher. Teacher gives information but they are not found to be wrong source of information. The students may have got very few alternative sources of knowledge from teachers. The greatest no. of students having misconception was found to be in question no.20 which was about the concept of heated gas. They have mentioned their source of knowledge in this question to be from their own intrinsic knowledge. This misconception has aroused due to their own preconceived thoughts. The least chosen (12.5%) source of misconception in question no.20 was knowledge gained from teacher. Students may not read books to understand the concepts but they rely more on teachers or their own source of intrinsic knowledge.

The main findings of the study are:

- Out of 120 students, in average, 31 (26%) students had misconception in biotechnology, and 45 (37.84%) students had misconception in sources of heat and energy.

- In biotechnology, most of the students had misconception in the question - "Biotechnology techniques used to synthesize multiple copies of desired product i-e organs a)gene therapy b) Genetic engineering c) Genetic testing d)cloning ".

- In sources of heat and energy the question about temperature had the highest number 65(54.2%) of students with misconception. The question was - "Which of the following expands more when its temperature raised 10°c? a) air b) cooper c) ice d) water ".

- Students with misconception in biotechnology, most of the students had chosen their source of knowledge from their intrinsic knowledge while least number of students had chosen their source of knowledge from teacher.

- Students with misconception in sources of heat and energy, most of the students had chosen their source of knowledge from their intrinsic knowledge while least number of students had chosen their source of knowledge from teacher.

4. Conclusion

From the above findings, some important conclusions can be drawn. Most of the Students in general science have misconception, which has affected the learning of students. This suggests the conclusion that there misconceptions in general science among elementary level. The maximum number of students developed the falsified concept in chapter 9TH (sources of heat and energy). Most of the students' source of misconception in science was found to be from their own intrinsic knowledge. Most of the student's source of falsified concept in heat and energy was from their own intrinsic knowledge, which they assume to be right. They have some kind of deeply rooted thinking in their mind for every concepts and it is very

hard to replace with the correct scientific knowledge. In average, the least chosen source of misconception was from the teacher. Teacher gives information but they are not found to be wrong source of information. The students may have got very few alternative sources of knowledge from teachers. The least number of misconceptions in chapter 3rd (biotechnology). Among 120 students, 26% students had misconception in biotechnology and the remaining 74% students had a correct concept of science in biotechnology. Most of the students have chosen their source of misconception to be from their intrinsic knowledge. It is obvious because biology is a subject which students can relate with their life experiences. It is much more systematic in their reasoning for agreeing or disagreeing with the ideas hence biology education itself is reinforcing these intuitive ways of thinking.

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