A STUDY OF ALTERNATIVE CONCEPTIONS IN BIOLOGY AMONG 12th CLASS STUDENTS

CHAPTER 1.

INTRODUCTION

CHAPTER 1. INTRODUCTION

1.1. Introduction

Human has progressed a lot in his way of living from ancient times till now. From discovering fire to discovering newer states of matter like plasma, human has advanced in his own level of thinking, understanding, analyzing and interpreting phenomenon around him. With every passing year we come across a wide range of branches in science, showing a newer aspect of it every time, like neuroparasitology (study of behavioural change in host body due to parasite), quantum biology (study of biological phenomenon showing quantum properties), exo-meteorology (study of planets other than earth), nutrigenomics(study of relation between the nutrition, diet and gene expression), etc.

Keeping in mind such advances in the field of science, the education system requires well efficient ways and methods to teach science in classroom context. There has been lot of policies and commissions to bring change in the teaching style of science. "Good science education is one that is true to learner, true to life and true to science." (NCF, 2005). Children learn more from unstructured environment, than a structured one like school. Unstructured environment of learning may include home, playground, neighbourhood, etc. All these learning from structured as well as unstructured environment form concepts in the mind of child about different phenomenon around him/her. This sometime leads to the formation of alternative conceptions among students, which is the concern of the study here.

Concept is a word, an idea or a mental image of an object, process or phenomenon. (Textbook for B.Ed. , 2013). Lot of factors affect the concept formation like environment of the learner, prior knowledge, mental condition, opportunity for

observation and application of concept provided, interest in subject, etc. In present study researcher tried to find out the possible alternative conceptions in biology and the reason for formation of such alternative conceptions.

1.2. Conceptualization of the problem

It has been seen that a paradigm shift in pedagogy is taking place over years, shifting from teacher and subject centered approach to a student centered approach, behaviourism to constructivism, lecture method to problem solving and activity based methods, and the list goes on. But when we talk of ground reality, is there really a change in pedagogy in each and every school today? Although some private and government schools have tried to take initiative to bring change in teaching learning process, most of the schools still have the conventional way to teaching learning till now in practice. The problem with these conventional methods arises when an authoritative teacher tries to give his knowledge to students, as it is, without even considering the cognitive ability, understanding, conception and prior knowledge and experience of students or learner. Mostly, this leads to rote learning and passive learning among students.

As a natural human behaviour, students or learners sometime try to explain the phenomenon around them or any theory in their curriculum on the basis of their prior knowledge, experience, etc. This may sometime lead to the formation of alternative conception or misconceptions. They have some advantages too like, the formation of alternative conception or misconception leads to development of thinking and reason capacity in individuals. Misconceptions or alternative conceptions are not always fallacy or faulty, they may sometime leads to greater inventions and discoveries, questioning the predefined theories and principles. Present study focuses on such misconceptions oraternative conceptions seen in biology among 12^{th} class students.

1.3. Background of the problem

Studies show that the teaching learning process can be sometime very vulnerable to misunderstandings. Learning in science can be considered to be a sequential process, so can the development of misconceptions; so that once a misconception has been acquired it may be carried on and built upon further. (Thompson & Logue, 2006). There has been a significant amount of research work done in the field of misconception or alternative conceptions in the past decades. As our present pedagogy system is highly examination oriented, students learn, not for the sake of widening the horizons of the knowledge but they adhere to rote learning without thinking which is worthless and meaningless. Mostly complex concepts are learnt without having proper understanding of simple concepts. So the students misinterpret the concepts when they need to apply it in different situations. (Paul). After reading the literature related to misconception and alternative conceptions, it was found that, less research work has been conducted in the field of concepts in biological science as compared to that on physical science. Those researches done in biological sciences are confined to concepts of cell division, photosynthesis and respiration, etc. There has been a research work done in misconception in reproduction in (Yip, 1998) but recent study on the topic was not found.

1.4. Statement of the problem

Gap in the knowledge is seen through review of related literature in the research on misconceptions or more appropriately 'alternative conception' in biological science, specifically on the topic reproduction. Hence the problem chosen for research is stated as

1.5. Significance of the study

We have reached to a very advanced stage of technology in medical sciences now but the topic like reproduction is still a taboo in the Indian classroom contexts, especially in a backward district like Nuapada. There are researches which say that students possess a lot of misconception on the topic reproduction. We also note that some of the students surveyed seem not to have acquired many concepts of plant biology including concepts related to the biology, reproduction and evolution of plants. (Maskour, Alami, Zaki, & Agorram, 2019)

Reproduction is a key characteristic of all living organisms yet school biology often pays little or no attention to reproduction in taxa other than humans and a small number of 'typical' flowering plants. (Reiss, 2018) Research into students' concepts about the human body has focused on several organ systems, but the reproductive system has been largely overlooked. (Prokop & Fančovičová, 2008). There are also less research on 12th class biology students on misconception or alternative conception in the topic reproduction and hence the problem is chosen, to add knowledge to the particular field. This may also help further researches focusing on alternative conceptions or misconceptions.

1.6. Objectives of the study

In order to diagnose and reach to the source of misconception following objectives were determined.

1.6.1. To identify the common alternative conceptions in the topic Reproduction, among students of 12th standard.

1.6.2. To find the source of alternative conceptions in the topic Reproduction, among students of 12th standard.

1.7. Research questions

The research questions generated for the study are listed below.

1.7.1. What are the common alternative conceptions in the topic Reproduction, among students of 12th standard?

1.7.2. What are the sources of alternative conceptions in the topic Reproduction, among students of 12th class students?

1.8. Delimitations

1.8.1. *Sample*: The data has been collected from the students of standard 12th of CBSE affiliated schools in Nuapada, district of Odisha, i.e.; Jawahar Navodaya Vidyalaya, Odisha Adarsha Vidyalaya and Mahamaya Higher Secondary School.

1.8.2. *Content*: Alternative conception among students on the topic "Reproduction in Organisms, Sexual Reproduction in flowering plants, Human Reproduction and Reproductive Health" was focused in this study.

1.8.3. *Data collection procedure:* Due to covid -19 pandemic, the sample collection process was disturbed. The mode of data collection from one college i.e.; Mahamaya Higher Secondary School, was offline whereas from other two schools i.e.; Jawahar Navodaya Vidyalaya and Odisha Adarsh Vidyalaya were online. Some uncontrolled variables like interest and attitude of students, may differ while collecting the data.

1.9. Operational definition of terms

1.9.1. *Misconception:* The students who arrive in the classroom with inappropriate pre-existing notions about the world, which are not in harmony to scientific

explanations, are said to have alternative conceptions. Alternative conceptions are also called as pre-conceptions, naïve conceptions, naïve theories, 'alternative conceptions and alternative frameworks (Blosser, 1987, quoted in Kaur, 2020)

1.9.2. *Two-Tier Diagnostic Test:* diagnostic test framed in two tiers or phases. The first tier is the conventional multiple choice step and the second tier is the possible reasons of the given answer for the first tier (Mutlu & Sesen, 2015). It is followed by semi-structured interview, also part of Two-Tier Diagnostic Test.

1.10. Chapterization

The whole research work runs on 5 chapters. First Chapter is **Introduction**, which includes a general introduction of the study, conceptualization of the problem, background of the study, statement of the problem, significance of the study, objectives and research questions formulated for the study, delimitations and operational definitions of the terms and chapterization. Second Chapter covers the **Review of Related Literature** part, enclosing the past studies done in the topic alternative conceptions and misconceptions in physical science and biological science and research gaps found. Third Chapter is **Methodology** which covers introduction to the chapter, population, sample, sampling technique, data collection procedure, design of the study, tools used in the study and data analysis procedure. Fourth chapter is **Data Analysis** comprises of data analysis of both Two- Tier Diagnostic Test and Interview Schedule used in the study. Last Chapter deals with **Conclusion and Interpretation**, where findings of the study, scope for further research in the topic and conclusions of the study are discussed. Study ends with **Bibliography** and appendix attached to the document. **Appendix** includes the researcher-made tool used in the study.