CHAPTER 3.

METHODOLGY

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First and second chapter dealt with Introduction and Review of Related Literature. In the present chapter researcher has talked about the methodology used in the study, population, sample and sampling technique, tools used and data analysis procedure.

3.1. Introduction

Misconceptions or alternative conceptions are the concepts in the mind of learner which does not match with the universally verified and accepted scientific theories and concepts. Misconceptions/ alternative conceptions may develop anywhere, be it classroom or any other informal learning environment. Most studies done under in the field misconceptions and alternative conceptions used quantitative research design or mixed method design. Here are a wide range of methods used in different studies to diagnose and find remedies for misconceptions/ alternative conceptions. They are Three-Tier Diagnostic Concept Achievement Test (TTDCAT) used in (Kaur, 2020), Pre-test Post-Test Analysis used in (Sen & Chouhan, 2019) , Logical Thinking Ability Test(LTAT) and Attitudinal Scale used in (Gönen, 2008). Present study also tried to modify a diagnostic test tool, referring from the studies done earlier.

3.2. Population of the study

Research was conducted among 12th class students of CBSE board schools in Nuapada district. Total three CBSE schools were selected in Nuapada district namely Jawahar Navodaya Vidyalaya(JNV)- 19, Tarbod; Odisha Adarsha Vidyalaya(OAV), Jhagrahi and Mahamaya Higher Secondary School, Darlimunda.

3.3. Sample of the study

Total 53 students were selected through random sampling technique for two tier diagnostic test. Disturbances like closing of physical schools and college due to Covid-19 pandemic occurred which caused decrease in no. of samples and also difference in mode of data collection from samples (depending on the time when samples were collected). Anyhow researcher selected 16 students from Mahamaya Higher Secondary School, 19 from JNV and 18 from OAV for the study.

3.4. Data collection procedure

Data collection procedure was determined as to visit the schools selected as sample and give students the print out copies of the questions, interview schedule after completion of filling question forms. This type of visit was possible to conducted in Mahamaya Higher Secondary School. However due to Covid-19 pandemic, lock down was declared by government, eventually causing an unprepared long term closure of physical schools. Situation like this provoked researcher to collect data in online mode, distributing MCQ questions through google forms and conducting interview schedule through google meet and zoom meetings. Hence the data collected from JNV and OAV were held through online modes. No difference in tools or questions asked during offline and online mode were made, thereby trying for minimal errors, caused due to change in mode of data collection.

3.5. Design of the study

Researcher used here was qualitative research design. Method was descriptive survey method used among 12^{th} class students of Nuapada district. Samples were randomly selected and no further categorization of samples on the name of gender, age, school or locality was done.

3.6. Tool used in the study

The tool used for the research was self-made two tier diagnostic test. It was taken from (Mutlu & Sesen, 2015), where the researchers developed a Two Tier Diagnostic Testto assess the undergraduate students' understanding of the concepts of some general chemistry concepts. They performed the test in two versions. First open ended questions were given to students, analyzed qualitatively and then the Two-Tier Diagnostic Test was made in multiple choice format.

In the present study, such diagnostic achievement test was developed, where total 15 questions were asked. Each question has two parts/tiers. Tier one contains multiple choice question related to the concept of reproduction and tier two is short answer type question asking for reason for choosing the particular option (after each MCQ). After filling the questionnaire, unstructured interview schedule was conducted with selective students (those who provided relatively more wrong reason for the MCQs).

Two-Tier Diagnostic Test

Tier 1: Multiple Choice Questions (MCQ)

Tier 2: Reason for choosing the particular answer (Short answer type question)

Unstructured Interview Schedule(with selective students)

Each question was analyzed qualitatively, using graphs and pie charts to diagnose the alternative conceptions among students. Total number of wrong answer were counted per question, reasons were analyzed and then alternative conceptions were detected through unstructured interview schedule.

The MCQ and short answer type question collectively were used to fulfil the first objective of the study, i.e., "To identify the common alternative conceptions in the topic Reproduction, among students of 12^{th} standard." Later he unstructured interview schedule, carried out with selective students helped to fulfil second objective formulated

for the study, i.e., "To find the source of alternative conceptions in the topic Reproduction, among students of 12^{th} standard."

3.7. Data analysis procedure:

Data analysis procedure used in the study was qualitative analysis. First the data collected from the Two Tier Diagnostic Test was analysed. To get a proper representation of the results, pie charts were used to show the percentage of students choosing the options from MCQ(first part of Two Tier Diagnostic Test). The reasons of the diagnostic tests and interview schedule were analyzed separately. Sources of alternative conceptions were found out for each major concept used in the study. At last a discussion was made to conclude the analysis of the study