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RESEARCH PAPER

Analytical Understanding of High School students in Chemistry: An Inquiry

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Abstract

Learning Chemistry is a complex process. It involves various thinking patterns, activities and abilities which are combined to comprehend its nature. As a matter of fact, chemistry comprises of higher order concepts which require students to apply their higher order thinking capabilities. Thus students would find that chemistry is one of the toughest subjects at secondary level. Analysis is one of the higher orders of thinking skills and analytical understanding is required for studying Chemistry. In the fast moving world of today students at secondary school level tend to neglect the subject like chemistry. Therefore it necessitated the investigators to undertake this study. The investigators used Survey method. The investigator selected 120 eighth standard students from Mysore region which represents the population. Purposeful sampling technique is used. Findings of the study show that High school students have average level of analytical understanding in Chemistry and Students from nuclear and joint family do not differ significantly in analytical understanding of Chemistry.

Introduction

Learning Chemistry is a complex process. It involves various thinking patterns, activities and abilities which are combined to comprehend its nature. As a matter of fact, chemistry comprises of higher order concepts which require students to apply their higher order thinking capabilities. Thus students would find that chemistry is one of the toughest subjects at secondary level.Analysis is one of the higher orderof thinking skills and analytical understanding is required for studying Chemistry. It is opposed to descriptive understanding and involves grasping evidences and method behind a concept. The basic skills of analytical understanding are formal reasoning skills. Developing these skills and using them appropriately are major goals of science education of secondary level.

Review of Literature

M N B Prastiwi and E W Laksono (2018) made a study todetermine the analytical thinking and chemicalliteracy skill of senior high school students. This study was

quantitative descriptive method, describing the integrated skill of analytical thinking and student's chemistry literacy. 185 students of 12th grade science in KulonProgo in the academic year 2017/2018 were used as asample. In this study, the data were obtained from interviewing, delivering questionnaire, anddelivering test of integrated multiple choice with the number of 30 questions about hydrolysisconcept. The reliability of test was found to be 0.94. The integrated instrument aspectsconsisting of 4 indicators: explaining the phenomena by distinguishing chemistry concept,organizing chemistry problems by using chemistry understanding, analyzing the strategies andthe benefits of chemistry applications, and explaining the relationship among phenomena byusing chemistry concept. The result showed that the integrated ability between analyticalthinking and chemical literacy ability of the hydrolysis concept of the students is 56.76%.Thus, it can be concluded that the integrated ability between analytical thinking ability andchemical literacy of the students is fair.

Irwantoet. al. (2017) in their study said that science process skill and analytical thinking ability are needed in chemistry learning in 21st century. Analytical thinking is related with science process skill which is used by students to solve complex and unstructured problems. Thus, this research aims to determine science process skill and analytical thinking ability of senior high school students in chemistry learning. The research was conducted in TigaMaret Yogyakarta Senior High School, Indonesia; at the middle of the first semester of academic year 2015/2016 using the survey method. The survey involved 21 grade XI students as participants. Students were given a set of test questions consisting of 15 essay questions. The result indicated that the science process skill and analytical thinking ability were relatively low i.e. 30.67%. Therefore, teachers need to improve the students' cognitive and psychomotor domains effectively in the learning process.

Need and Significance

Mugging up tendency builds a pressure on students instead of enjoying and fails to serve the purpose of education. Instead of mugging up, if students analyze the problem or analyze the content while reading, they will be able to remember it for a longer time.Learning won't be a burden for them.It will act as a base which would help to understand other topics in Chemistry. Students have more tendencies to learn by heart the topic rather than the tendency to analyze and understand it. It helps students to recall it for a longer time and does not create pressure on the

students. In the fast moving world of today students at secondary school level tend to neglect the subject like chemistry and therefore it necessitated the investigators to undertake this study.

Objectives of the Study

- To find out the level of analytical understanding of high school students in Chemistry.
- To find out significant difference, if any, between students from nuclear and joint family.

Hypotheses of the Study

- High school students have average level of analytical understanding in Chemistry.
- Students from nuclear and joint family do not differ significantly in analytical understanding of Chemistry.

Method of the study

The investigators used Survey method**.** In research literature survey method studies, describes and interprets what exists at present. It is concerned with the analytical understanding of the high school students.

Sample of the study

The investigators selected 120 eighth standard students from Mysore region which represents the population.Purposeful sampling technique has been used.Population reflects the combination of students from joint and nuclear families. This investigation was done during the academic year 2018-2019.

Tool used

As a readymade research tool is not available for the present field of study, the investigator used a self-prepared tool in order to measure analytical understanding in chemistry of high school students. The tool consists of 25 items; multiple choice types of questions containing four options for each question.

Scoring procedure

The tool consisted of multiple choice types of questions, based on analytical understanding in chemistry.If students score between20-25, it can be said that students' analytical understanding is very high.If students score between 15-20 it can be said that students' analytical understanding is high.If students score between 10-15 it can be said that students' analytical understanding is average.If

students score between 05-10 it can be said that students' analytical understanding is below average.If students score between 0-05 it can be said that students' analytical understanding is poor.

Reliability and Validity

The investigators have established the reliability of the scale by Test-retest Method and 'r' value is found to be 0.71. The investigators sought the opinion of the subject experts in the field of chemistry and items were found suitable for the present study. Hence, content validity was established.

Statistical analysis

The obtained data were subject to statistical techniques like mean, standard deviation and t-test. The calculation and interpretation are presented in different tables below.

Analysis and Interpretation of the data

The calculation and interpretation of data are given below.

Table – 1
Mean & SD for Analytical Understanding of High School students in Chemistry

Variable	Number	Mean	SD
Analytical Understanding in Chemistry	120	10.42	2.776

From the table 1 it is found that the mean of total analytical understanding of high school students in chemistry score is 10.42 with a standard deviation of 2.776. It is observed that if an individual score is between10-15 it can be said that a student's analytical understanding is average. So it is inferred that the analytical understanding of high school students is at average level. Hence, the hypothesis thatHigh school students have average level of analytical understanding in Chemistry is accepted.

Table – 2
Mean, SD and t-value of students from nuclear and joint family

Category	Number	Mean	SD	t-value	Significant level
Nuclear Family	90	10.32	2.86	0.883	Not Significant
Joint Family	30	10.83	2.33		

It is evident from the table 2 that the obtained 't' value (0.883), relating analytical understanding in chemistry, mean scores is less than the table value (1.96) at 0.05 level of significance. Hence the null hypothesis that Students from nuclear and joint family do not differ significantly in analytical understanding of Chemistry is accepted.

Findings of the study

- High school students have average level of analytical understanding in Chemistry.
- Students from nuclear and joint family do not differ significantly in analytical understanding of Chemistry.

Conclusion

In the context of today, students need to excel in maximum use of their faculty. To understand the subject chemistry one needs to have analytical understanding for better comprehension of the subject. This study reveals that the secondary students have only average level of understanding of chemistry. Further family type also pave a way to develop analytical skills of students. This study shows that students from nuclear and joint family do not differ significantly in analytical understanding of Chemistry.Possession of analytical skill can be taken as one of the factors that possibly play a significant role on the achievement of students, more especially in the area of chemistry. Therefore, secondary school chemistry teachers should take into consideration the analytical skill possession of their students in their instructional strategies and also in academic planning.

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