INTRODUCTION

Education is considered as the most effective means for the all-round development of the learner, which helps him to grow socially, intellectually, morally and emotionally. Education should be organized in such a way that each child is inspired to participate actively in the economic reconstruction of society. They should understand that development of modern society depends upon the development of Science and Technology. They should try to develop themselves technologically so that technological efficiency and high level competence is developed in them and they are able to enjoy maximum advantages of science in their daily life. Education is the enrichment of the human knowledge and experience by going through the process of thinking experimentation and drawing conclusion. Today emphasis is on learning rather than mere teaching. Learning is necessary for meaningful participation in a complex world, especially in one which human activity is defined by dynamic socio historical systems of meaning. Learning is meaningful only when students are capable to construct knowledge on their own way, transfer the same and use it in new learning situations.

Science education being an essential component of general education, which is the need and right of every human being, it should also play an important role to make the new generation capable of handling the problems in an effective way and of taking wise decisions in their future life. Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The learners may be children, college students, or adults within the general public. The field of science education includes work in science content, science process (the scientific method), some social science, and some teaching pedagogy. The standards for science education provide expectations for the development of understanding for students through the entire school curriculum from elementary level to higher secondary level. The traditional subjects included in the standards are physical, life, earth, space, and human sciences. The teaching of science offers students the ability to access a wealth of knowledge and information which will contribute to an overall understanding of how and why things work like they do. Science is able to explain the mechanics and reasons behind the daily functioning of complex systems, which range from the human body to sophisticated modern methods of transport. Children and students are able to use this knowledge to understand new concepts, make well-informed decisions and pursue new interests. Science also helps to provide tactile or visible proof of many facts we read about in books or see on the television; this helps to increase understanding and helps children and teenagers to retain that information.

Modern science education gives due significance to ‘process skills’ their advantage, application and progress. Science is considered more as a process than as a product. The current innovations in schools emphasize the processes of science; the way scientists advance their knowledge and solve problems. The functional concept of science and the use of proper methods of teaching will make science teaching and learning effective, useful and interesting. Science if studied properly developed power of thinking, reasoning, curiosity, creativity, open mindedness, interest and scientific attitudes.

A science teacher has to adopt the right method of teaching in order to make children learn effectively. For choosing right method for a given situation, the teacher must be familiar with different methods of teaching. Science learning provides training in science method and also helps to develop a science attitude of mind in the learner.

[1,2,3]

STATEMENT OF THE PROBLEM

The present study is intended to find out the effect of predict-observe-explain strategy on achievement in chemistry among students at secondary level. Hence the study has been entitled “EFFECT OF PREDICT-OBSERVE-EXPLAIN STRATEGY ON
ACHIEVEMENT IN CHEMISTRY OF SECONDARY SCHOOL STUDENTS

DEFINITION OF KEY TERMS

Predict-observe-explain strategy:
The Predict-observe-explain strategy is often used in science teaching. It requires three tasks to be carried out first; this strategy helps to uncover individual students' predictions, and their reasons for making these about a specific event. Second, students describe what they see in the demonstration-observation. Third, students must reconcile any conflict between their prediction and observation explanation. This strategy focuses on linking students existing ideas and beliefs relevant to a situation and exploring the appropriateness of these ideas and beliefs.

In the present study predict-observe-explain strategy is the strategy adopted by the investigator to transact Chemistry content by setting up the learning environment according to the theory of this strategy [5]

Achievement in Chemistry: - Achievement is the knowledge attained/skills developed in school subjects or marks assigned by the teacher.

In the present study Achievement in chemistry refers to the scores obtained by secondary school students in the achievement test in chemistry prepared by the investigator.

Secondary school students: - Secondary school students are those who are studying in standard VIII, IX and X. In this study standard VIII students studying in schools recognized by Government of Kerala were considered as the representative of secondary school students.

HYPOTHESES OF THE STUDY

The hypotheses of the present study are:

H (1): There is significant difference in the mean scores of Achievement in Chemistry between secondary school students following predict-observe-explain strategy and existing method.

H (2): There is significant difference in the mean scores of Achievement in Chemistry between secondary school students following predict-observe-explain strategy and existing method with respect to each of the objectives, viz.,

a. Knowledge
b. Process
c. Application

H (3): There is significant difference in the mean scores of Achievement in Chemistry between Boys at secondary level following predict-observe-explain strategy and existing method.

H (4): There is significant difference in the mean scores of Achievement in Chemistry between Girls at secondary level following predict-observe-explain strategy and existing method.

H (5): There is significant difference in the mean scores of Achievement in Chemistry between Boys and Girls following predict-observe-explain strategy at secondary level.

H (6): There is significant difference in the mean scores of Achievement in Chemistry between Boys and Girls following predict-observe-explain strategy with respect to each of the objectives, viz.,

a. Knowledge
b. Process
c. Application

2. METHODOLOGY

A brief description of methodology is presented under the following headings

Variables

The present study warrants three types of variables, independent, dependent variable and control variable.

Independent Variable: Strategy adopted (Predict-Observe-Explain strategy/Existing method)

Dependent Variable: Achievement in Chemistry among secondary school students.

Control Variable: The student’s age, teacher factor, motivation and the length of the instruction.

Method adopted for the study

The present study was intended to measure the effect of predict-observe-explain strategy on Achievement in Chemistry of secondary school students. For this purpose experimental method is used. The design selected for the study was Pre-test Post-test Nonequivalent group Design.

Sample for the study

Two divisions of standard VIII of K.P.M High School, Poothotta, Ernakulam district was selected as sample for the study. Each division consisted of 54 students. From these students, 35 students each, who have attended all the classes and have appeared for the Pre-test and Post-test, were selected as final sample [3,4]

Tools Used for the study

The tools used in the present study are:

1. General datasheet
2. Achievement test in chemistry (prepared by the investigator)
3. Lesson transcripts based on predict-observe-explain strategy (prepared by the investigator)
4. Lesson transcripts based on existing method (Prepared by the investigator)

Procedure adopted for the study

The investigator has taught the experimental and control groups according to the respective lessons transcripts prepared. An Achievement test in Chemistry was administered to both the groups before and after the treatment. The data collected were analyzed using statistical methods and interpreted accordingly [5]

Statistical techniques used

Major statistical techniques used for the analysis of data are the following; it is divided in to two;

Descriptive statistics

1. Arithmetic mean
2. Standard deviation

Inferential statistics

The statistical techniques used for the study are

1. Two tailed test of significance between small independent samples.
2. Analysis of co-variance (ANCOVA)
3. Cohen’s d

3. MAJOR FINDINGS OF THE STUDY

Major findings arrived at based on the hypotheses formulated are as follows

1. Comparison of the Achievement in chemistry between secondary school students following Predict-Observe-Explain strategy and existing method.

The investigator analyzed the Achievement in Chemistry of secondary school students following Predict-Observe-Explain strategy and existing method using ANCOVA. The result of analysis
showed that there is significant difference in the mean scores of Achievement in chemistry between students at secondary level following Predict-Observe-Explain strategy and existing method (F=12.115, p<0.05) (M1=16.581, M2=13.848).

Since the mean scores of experimental group (ME=16.581) is greater than that of the control group (MC=13.848). From this it can be concluded that Predict-Observe-Explain strategy is better than Existing method for enhancing Achievement in Chemistry.

2. Comparison of the Achievement in Chemistry between secondary school students following Predict-Observe-Explain strategy and existing method with respect to each of the objectives viz.,

a. Knowledge
b. Process
c. Application

a. Knowledge (F=69.617, P<0.05) (ME=4.034, MC=2.307)
b. Process (F=17.409, P<0.05) (ME=8.345, MC=6.112)
c. Application (F=38.619, P<0.05) (ME=5.917, MC=3.712)

Results of the analysis showed that there is significant difference in the adjusted mean scores of Achievement in Chemistry between secondary school students following Predict-Observe-Explain strategy and Existing method with respect to each of the objectives. Since the mean scores of experimental group is greater than that of the control group for each of the objectives it can be concluded that the application of Predict-Observe-Explain strategy has a major role in enhancing Achievement in chemistry among secondary school students.

3. Comparison of Achievement in Chemistry between boys at secondary level following Predict-Observe-Explain strategy and Existing method.

The investigator analyzed the post test scores of Achievement in Chemistry of boys following Predict-Observe-Explain strategy and existing method using ANCOVA. The result of analysis showed that there is significant difference in post test scores of Achievement in Chemistry between Boys following Predict-Observe-Explain strategy and Existing method (F=5.287, P<0.05) (ME=17.047, MC=14.325) . Since the mean scores of experimental group is greater than that of the control group it can be concluded that Predict-Observe-Explain strategy is better than Existing method in enhancing Achievement in Chemistry between boys at secondary level.

4. Comparison of Achievement in Chemistry between girls at secondary level following Predict-Observe-Explain strategy and Existing method.

The investigator analyzed the post test scores of Achievement in Chemistry of girls following Predict-Observe-Explain strategy and existing method using ANCOVA. The result of analysis showed that there is significant difference in post test scores of Achievement in Chemistry between secondary school girls following Predict-Observe-Explain strategy and Existing method (F=7.209, P<0.05) (ME=16.180, MC=13.409) . Since the mean scores of experimental group is greater than that of the control group it can be concluded that Predict-Observe-Explain strategy is better than Existing method in enhancing Achievement in Chemistry of girls at secondary level.

The results reveals that the difference in mean scores of Achievement in Chemistry between Boys and Girls following Predict-Observe-Explain strategy is not significant. Hence Hypothesis5 is rejected.

b. Process

The result of analysis showed that there is significant difference in mean scores of Achievement in Chemistry with respect to each of the objectives, viz.

a) Knowledge (t=0.075, P>0.05)
b) Process (t=0.966, P>0.05)
c) Application (t=0.334, P>0.05)

TENABILITY OF HYPOTHESES

Hypothesis 1

There is significant difference in the mean scores of Achievement in chemistry between secondary school students following predict-observe-explain strategy and existing method.

This hypothesis was tested and it is found that there is significant difference in mean scores of Achievement in Chemistry between secondary school students following Predict-Observe-Explain strategy and Existing method. So Hypothesis1 is accepted.

Hypothesis 2

There is significant difference in the mean scores of Achievement in chemistry between secondary school students following predict-observe-explain strategy and existing method with respect to each of the objectives, viz.,

d. Knowledge

e. Process

f. Application

Analysis of the data showed that there is significant difference in mean scores of each of the objectives of Achievement in Chemistry between secondary school students following Predict-Observe-Explain strategy and Existing method. So the Hypothesis2 is accepted.

Hypothesis 3

There is significant difference in the mean scores of Achievement in chemistry between Boys at secondary level following predict-observe-explain strategy and existing method.

The result revealed that there is significant difference in the adjusted mean scores of Achievement in Chemistry of Boys following Predict-Observe-Explain strategy and Existing method. So Hypothesis3 is accepted.

Hypothesis 4

There is significant difference in the mean scores of Achievement in chemistry between girls at secondary level following predict-observe-explain strategy and existing method.

The result revealed that there is significant difference in the adjusted mean scores of Achievement in Chemistry between girls following Predict-Observe-Explain strategy and Existing method. So the Hypothesis4 is accepted.

Hypothesis 5

There is significant difference in the mean scores of Achievement in chemistry between boys and girls following predict-observe-explain strategy at secondary level.

The results reveals that the difference in mean scores of Achievement in Chemistry between Boys and Girls following Predict-Observe-Explain strategy is not significant. Hence Hypothesis5 is rejected.

Hypothesis 6
There is significant difference in the mean scores of Achievement in chemistry between boys and girls following predict-observe-explain strategy with respect to each of the objectives, viz.,

d. Knowledge

e. Process

f. Application

The difference in the mean scores of Achievement in Chemistry was not found to be significant with respect to the objectives Knowledge, Process and Application. So the hypothesis is rejected.

EDUCATIONAL IMPLICATIONS

The present study was intended to measure the effect of Predict-Observe-Explain strategy on Achievement in Chemistry among secondary school students. From the findings and discussions the investigator arrived at the conclusion that Predict-Observe-Explain strategy is can be employed in secondary school classrooms for enhancing Achievement in Chemistry among secondary school students. Based upon the findings the following recommendations are found.

1. It is recommended to provide proper training and periodical orientation to teachers, so as to enable them to adopt Predict-Observe-Explain strategy in a scientific manner.

2. From the present study it is proved beyond doubt that Predict-Observe-Explain strategy can be applied to secondary level as the investigator could see that the students are seen more active and motivated to learn Chemistry lessons systematically. But the textbooks and hand books prepared on the basis of existing method are not helpful to provide enough knowledge as visualized through this learning approach. Hence it is provide guidelines about how to use handbooks of Predict-Observe-Explain strategy in classrooms. Thus the teachers gain enough knowledge to handle the class as perceived by this strategy.

3. As part of the study the investigator measured the level of achievement among students and the investigator inferred that through the introduction of Predict-Observe-Explain strategy can be considered as a feasible strategy especially in Chemistry, hence it is recommended to introduce Predict-Observe-Explain strategy at secondary level.

4. The findings of the present study proved beyond doubt that the application of Predict-Observe-Explain strategy is beneficial and useful to learners for learning concepts and principles easily in Chemistry. Hence it is suggested while framing curriculum stress be given to Predict-Observe-Explain strategy.

5. Through Predict-Observe-Explain strategy teachers can motivate the students to develop interest in Chemistry and also help them to develop the ability to openly constructively express their opinion.

CONCLUSION

POE strategy is highly effective in educational context. It helps to improve Teaching-Learning standards. POE strategy allows students to reflect on their experience and understanding of a subject. The findings of the study revealed that Predict-Observe-Explain strategy is effective in enhancing the Achievement in Chemistry of secondary school students. Hence the investigator hopes that the findings of the study will act as guidelines for teachers to adopt this strategy in their classrooms.

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REFERENCE


