Effect of Integrated thinking skills on achievement in Physics of Senior Secondary School Students

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Abstract

Critical thinking in physics can be interpreted in a variety of ways. Some consider it in an evaluative sense that is used to determine the quality of decision or an argument. Critical thinking in Physics is the ability and disposition to incorporate prior knowledge, scientific reasoning, and cognitive strategies to generalize, prove, or evaluate unfamiliar scientific situations in a classroom for reflective manner.

KEYWORDS: Integrated thinking skills, physics of senior secondary school students.

INTRODUCTION

In 1983, the National Commission on Excellence in Education (NCEE) reported in 'A Nation at Risk' that, the United States educational system needs to reform its classroom environment so that all the students acquire high-level skills in order to become critical consumers and participants in society. The development of critical thinking skills produces intellectual and socially competent citizens who effectively cooperate with other people and challenge real world problems (Glaser 1985).

The higher aim is to develop the child's resources to think and reason Scientific to pursue assumptions to logical conclusions and to handle abstractions. The cognitive abilities like open mindedness, Problem solving, establishing cause and effect relationship, creative and critical thinking are not given enough emphasis in science teaching. Students who have difficulty in Physics are often those who cannot use critical thinking to improve their reasoning. They usually need help to improve their ability to solve problems and to think critically is a valuable asset in enhancing higher cognitive abilities.

It is a widely acknowledged notion that Physics is a very important subject and a great amount of concern surrounds children's Science education. Despite this fact, Physics is one of the biggest failure areas of education in almost all countries. This view is highlighted by "The Third International Mathematics and Science Study and programme for international Students Assessment" which has focused on problems concerning learning tasks in Physics and science education.

In order to develop the various abilities and critical thinking skills among the students, a Physics teacher should make sincere and consistent effort in acquiring and developing abilities and skills by learners in the classrooms. It is possible for a physics teacher to develop these cognitive abilities among students.

OBJECTIVES OF THE STUDY
1. To study the impact of integrated critical thinking skills on achievement in Physics.
2. To determine the relationship between the integrated critical thinking skills and achievement in Physics with respect to gender.
3. To find out the differences in the critical thinking skills and achievement scores based on gender.

HYPOTHESES

Based on the objectives of the study, the researcher formulated the following hypotheses in the present study;

HYPOTHESIS-1: There is no significant difference between the mean scores of control and Experimental group in the post test achievement.

HYPOTHESIS-2: There is no significant difference between the mean scores of boys and girls in their post test achievement.

HYPOTHESIS-3: There is no significant difference between the group and gender on the post achievement test of the experimental group.

HYPOTHESIS-4: There is no significant difference between the mean scores of groups and gender in the post test achievement with respect to integrated critical thinking skills.

HYPOTHESIS-5: There is no significant difference between the group and gender of integrated critical thinking skills on the post achievement test of the experimental group.

Design of the Experiment

The Randomized pretest, posttest control group design was used with a purposive sample in the form of intact sections of class 12th of the same school. A figurative representation of the design is given below.

<table>
<thead>
<tr>
<th>Control Group</th>
<th>Experimental Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>Pre-Test</td>
</tr>
<tr>
<td>Testing of ICTS &amp; Achievement in Physics</td>
<td>Testing of ICTS &amp; Achievement in Physics</td>
</tr>
<tr>
<td>Content Treatment</td>
<td>Content treatment and package of Integrated critical thinking skills.</td>
</tr>
<tr>
<td>Post-Test</td>
<td>Post-Test</td>
</tr>
<tr>
<td>Testing of ICTS &amp; Achievement in Physics</td>
<td>Testing of ICTS &amp; Achievement in Physics</td>
</tr>
</tbody>
</table>

Sampling
The sample of the experimental group and control group (Total and gender wise) at the final stage of the experiment, which was considered for statistical analysis, is presented in the table.

<table>
<thead>
<tr>
<th>Nature of Group</th>
<th>Gender</th>
<th>Number of Students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>Boys</td>
<td>45</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>Boys</td>
<td>45</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Girls</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>140</td>
</tr>
</tbody>
</table>

**Tools used for the Study**

The researcher has developed the achievement test based on 12th standard physics content followed by standardization procedure. It was decided to have two tests in the study, viz. Usual Physics achievement test and Achievement test based on integrated critical thinking skills components. The final version of the tool having test-1 consisted of 25 items and test-2 consisted of 30 items (each component having six items). These tools were constructed and their reliability and validity were established.

**Statistical technique**

For analyzing the data t-test, ANOVA, ANCOVA and factorial design technique were used. These techniques were used to analyze the using SPSS 16.0 version by researcher.

**Major findings of the study**

1. There is a significant difference between the post test achievement of control and experimental group.
2. There is no significant difference between the mean scores of boys and girls in the post test achievement.
3. There is a significant interaction between group and gender on post test achievement.
4. There is a significant difference between the mean scores of group and gender in their post test achievement with respect to total integrated critical thinking skills.
5. There is a significant interaction between group and gender on total integrated critical thinking skills on achievement after the intervention programme.

**CONCLUSION OF THE STUDY**

The study reveals that the package of integrated critical thinking skills has helped the 12th standard students to enhance their academic achievement in Physics as evident...
from the post-test of achievement. This means, package of integrated critical thinking skills has a significant impact on the achievement of 12th standard students in Physics.

The study also reveals that the boys and girls do not differ in their achievement in Physics. But, boys and girls differ in the critical thinking skills. Gender has influenced integrated critical thinking skills. This means, boys have shown better performance than girls in the integrated critical thinking skills. (This remains controversial area-Ed.) However, group and gender have their significant Interaction effect on achievement in Physics also; they have significant Interaction effect on the Integrated Critical Thinking skills.

SUGGESTIONS FOR FURTHER RESEARCH

On the basis of the researcher's acquaintance with the problem and also keeping the limitations in view, the following are the few suggestions for further research in this area;

1. The present study can be extended to Higher Education students who are studying in other branches of science.
2. This study could be extended to other components of the critical thinking skills.
3. The present study can be extended to Higher Education teacher trainees who opt for methods of teaching Physics.
4. A similar study can be extended to social science at the College Level.

BIBLIOGRAPHY


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