Enhancing the Science Process Skills through Phet Simulation

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Abstract

The aim of this study was to understand the science process skills among IX standard students with respect to Phet simulation. Science education is much important to understand day to day life concepts and develops problem solving skills of the students. The single group design was adopted during the experiment. The investigator adopted purposive sampling technique for this study. The sample consists of 30 Students. Generally, science process skills are essential to understand science concepts. The science process skills are classified basic and integrated process skills. The concept of chemical bonding in class IX is little complex to understand. To teach the concept, teacher needs an effective method. So, the investigator has adopted Phet simulation to understand the science process skills. Science process skills are the competencies and techniques of scientific methods which is necessary and sufficient condition to discover scientific knowledge. Phet simulations are interactive simulations that may scaffold the students to understand the concepts in terms of science process skills. This proposed study helped the science teacher to modify his or her instructional strategies with technical support and also for enhancing the performance of students in science subject.

Keywords: Science process skills, Phet Simulation, Chemical bonding.

1. Introduction

Science Process Skills, we teach a subject not to produce little living libraries on that subject, but rather to get a pupil to take part in the process of knowledge getting; knowledge is a process not a product (Bruner, 1960) [1]. Science process skills may help the learners to understand the concepts very clearly. Basic process skills like observing, Inferring, classifying, predicting and integrated process skills like hypothesizing, interpretation data, experimenting, generalizing, manipulating skills also assists to enhance science as a process and never be a product [2]. To understand some complex concepts, we need some specific methods. The current scenario of science education needs innovative methods for their teaching learning practices. Phet simulations provide an engaging and intuitive way for students to explore various topics, including physics, chemistry, biology, and maths to understand complex problems and innovative way to solve them. Phet simulations aim to enhance teaching and learning by providing research-based interactive computer simulations assists the learners to understand the concept [3]. Phet simulations have been used to enhance skills, previous studies on simulations interventions provide limited findings and show moderate effects on student’s learning [4]. In class IX certain selected concepts in Chemical bond was taken to prepare some simulations were used to understand different types of bonding like ionic and covalent bonding through certain selected process skills like Observe, Infer, Hypothesize and manipulate.

2. Need and significance of the study

In 21st century teachers have to adopt new strategies in their classroom practice [5]. The science subject
requires innovative instructional strategies for improving the academic performance of the students in science process skills [6, 12]. There are different science subjects are available in school education each has different characteristics which requires some innovative strategies to understand the learners. Especially in teaching of chemistry needs some innovative teaching strategies to understand the concepts like chemical bond in better way, it is not an easy to explain the concept to the students in traditional classroom settings [7]. Hence, the new innovative strategies like Phet simulations would be administered to enhance the knowledge in chemical bond among learners with respect to process skills [8, 13]. Phet aims to improve the way science is taught and learned by creating research-based interactive computer simulations. Phet simulation develops logical and critical thinking skills among students to learn and understand things [9]. Based on the evidences raised in previous literature and also need of the present context the proposed study would be need and significance one [10]. Science process skills are essential abilities that empower both scientists and students to explore the natural world systematically [11]. These skills form the bedrock of scientific inquiry and problem-solving. When science process skills integrated with Phet simulation would be more effective to the learner in clarity of the concepts [12].

3. Methodology
3.1 Sample of the study
The single group design was employed during the experiment. The investigator was used purposive sampling technique in this study. The 30 Students from IX standard in Govt High school, Nagamangalam, Ariyalur dt was used as the sample for the present investigation, as shown in Figure 1 and 2 [14].

3.2 Objectives of the study
- To Identify the needed process skills to improve the understanding of chemical bond
- To assess the level of science process skills among IX standard students
- To enhance the achievement of science process skills through Phet simulation among IX standard students

![Figure 1 Phet Simulation for NaCl](image)

![Figure 2 Phet Simulation Plot](image)

3.3 Hypotheses of the study
1. The level of science process skills among IX standard students are low
2. There is no significance relationship between the achievement of science process skills Phet simulation among IX standard students
4. Result and discussion

4.1 Hypothesis 1
The level of science process skills among IX standard students are low. The Table 1 study indicates that there is an enhancement of science process skills 60% in moderate level and 10% in high level.

Table 1 Level of Science Process Skills

<table>
<thead>
<tr>
<th>Level</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30%</td>
<td>60%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Figure 3 Level of Science Process Skills for Students

4.2 Hypothesis 2
There is no significance relationship between the achievement of science process skills through Phet simulation among IX standard students. The level the achievement of science process skills through Phet simulation in post-test is higher than that of Pre-test.

Table 2 Achievements of Science Process Skills

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre test</td>
<td>30</td>
<td>5.8</td>
<td>0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post test</td>
<td>30</td>
<td>9.2</td>
<td>0.85</td>
<td>16.42</td>
<td>S (2)</td>
</tr>
</tbody>
</table>

Conclusion
The level the achievement of science process skills through Phet simulation in post test is higher than that of Pre-test. So the present study has proved that level of science process skills among IX standard students through Phet simulation has enhanced. Therefore, it is concluded that Phet simulation is more effective because it offers a more attractive, instructive and interactive visual presentation to the learners which attracts the attention and helps for their improvement in science process skills among IX standard students and also study helps for science teacher to improve their instructional capability for enhancing the academic performance of students. The science subject requires such kind of innovative strategies for learning the concept among teachers and students.

Reference

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