Abstract

Constructivism is defined as meaning-making theory that offers an explanation of the nature of knowledge and of how human beings learn. It focuses on "knowledge construction" not "knowledge reproduction". Constructivism rely on some form of guided discovery where the teacher avoids most direct instruction and attempts to lead the student through questions and activities to discover, discuss, appreciate, and verbalize new knowledge. Apart from science learning, if we take a content, it should be in text form. We can express that content in the concept map form, it is very effective. It helps to remember the content in the better way. In science, concept map play a vital role for the purpose of improving knowledge, skill and understanding ability. Hence, the study is entitled as "A Novel Knowledge Construction through Constructivist Approach for Science Learning in the Knowledge Era". The investigators visited two schools namely Cheran Vidyalaya Matric. Higher Secondary School and Vidhya Siksha Matric School to teach science subject with concept maps and evaluate the outcome. The results showed an improvement in the studies of the students.

1. Introduction

Educators can choose to adopt a variety of teaching methods. When it comes to teaching there are a variety of methods and approaches educators use in the classroom. It is important for educators to choose methods that best meet the needs of their students and fit with their personality and comfort level along with the subject area being taught.
1.1 Constructivist Approach of Teaching

Learning theories have an impact on classroom practice. The constructivist theory of education was developed by Lev Vygotsky, a psychologist and educator born in 1896. Vygotsky's theory was centered on the principles of social constructivism. Jerome Bruner later combined Vygotsky's theories with those of Jean Piaget, a cognitivist who regarded students as learners in their own right, learning through their experiences. Vygotsky's ideas, along with those of Piaget, became widely influential in the 1960s. Their "child-centered" theory challenged didactic teaching, the more authoritative approach that had previously been favoured. The theories of constructivism put forth by Piaget, Vygotsky and Bruner all have implications for contemporary classroom practice. In the traditional teaching teacher used to dominate in the class by way of transmitting knowledge considering children as passive receivers / learners. However in the constructivist classroom students are considered as active social players learning with all enthusiasm. Constructivism has now come to dominate both thought and process in education. Constructivism is defined as meaning-making theory that offers an explanation of the nature of knowledge and of how human beings learn. It focuses on “knowledge construction” not “knowledge reproduction”. Constructivism rely on some form of guided discovery where the teacher avoids most direct instruction and attempts to lead the student through questions and activities to discover, discuss, appreciate, and verbalize new knowledge. The basic characteristics of constructivism are - Learning is an active meaning making process and not passive receptive process to solve meaningful problems.

1.2 Statement of the problem

Science is a process as well as knowledge children learn science by being involved not only with its content, but also with its methodology. The effective science facility accommodates both. Science study requires a variety of unique instructional material in addition to those materials common to all of education. Science is a dynamic, expanding body of knowledge, covering ever-new domains of experience.

Apart from science learning, if we take content, it should be a text form. We can express that content in the concept map form, it is very effective. It helps to remember the content in the better way. In science, concept map play a vital role for the purpose of improving knowledge, skill and understanding ability. In constructivist learning process the following will have to be encouraged by the teachers’ observation, contextualization, cognitive apprenticeship, collaboration, interpretation, multiple interpretation and multiple manifestations.

Hence, the study is entitled as “A Novel Knowledge Construction through Constructivist Approach for Science Learning in the Knowledge Era”.

1.3 Objectives of study

- To construct the concept maps for science learning at VII standard level.
- To find out the significant differences between the gains scores of the students in the constructivist approach for science learning in Cheran Matric Higher Secondary School and Vidhya Sikshaa Matric School.
- To find out significant differences in post-test mean achievement scores among girls in Cheran Matric Higher Secondary School and Vidhya Sikshaa Matric School.
- School.
1.4 Hypotheses

- There is no significant difference between the means of pre-test and post test scores of the students in the constructivist approach for science learning among the 7th std students in Cheran Matric Higher Secondary School and Vidhya Sikshaa Matric School.
- There is no significant difference between the means of pre-test and post test scores of girls in Cheran Matric Higher Secondary School and Vidhya Sikshaa Matric School.

2. Methods and Materials

The method of study used for this investigation is “Quasi Experimental method”
2.1 Variable

A variable is defined as to vary or alter susceptible to change, having no fixed Value. When applied to research variables are classified as independent or dependent. In this study, science learning is dependent variable and the constructivist approach is independent variable.

2.2 Experimental Procedure

2.3 Tool

Achievement test is constructed by the investigators for the purpose of improving science learning by using concept maps.
The questions are based on the topic of “Heat and Light” and “combustion and flame”. Pre-test and post-test was conducted for the purpose of identify the improvement of science learning when we use concept map in class room.

- Sun
- Sources of Heat
- Heat
- Thermometer
- Mirror
- Spherical mirror
- Light
- Combustion
- Types of Combustion
- Gaseous fuels
- Types of fuels
- Fire

2.4 Steps in experimental research

- Surveying the literature relating to the problem.
- Selecting and defining the problem.
- Stating of hypotheses.
- Constructing the experimental plan.

2.5 Sample

The sampling technique used by the investigator in the present study is “Simple Random Sampling”. In simple unrestricted random sampling, each unit of the population is given an equal chance of being select. The investigator has taken 20 VII standard students from Cheran Vidhyalaya and 18 students from Vidhya Siksha Matriculation School.

2.6 Statistical Method

The investigator has used the following descriptive statistical techniques for analysis the collected data.

- Mean
- Standard deviation

Inferential statistics is the process of trying to reach conclusions that extend beyond the immediate data. Use of the inferential statistics to make judgment about the probability that an observed difference between groups is dependable one or one that might have happened by chance in our study. The investigator has used the inferential statistical technique “t” test for analysing the collected data.

3. Testing Of Hypotheses

Hypotheses 1: There is no significant difference between the means of pre-test and post test scores of / the students in the constructivist approach for science learning among the 7th std students in Cheran Matric Hr.Sec School and Vidhya Sikshaa Matric School in Dindigul district.
Table 1
Mean, standard deviation, calculated ‘t’ value of the pre-test and post test scores of the VII standard students of Cheran Matric Hr. Sec School in Dindigul district, at the significant level of 0.05.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>‘t’ value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>18</td>
<td>70</td>
<td>9.25</td>
<td>2.35</td>
<td>Significant</td>
</tr>
<tr>
<td>Post Test</td>
<td>18</td>
<td>77.06</td>
<td>7.79</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A close look into the mean scores provided in table 1 indicates that the mean score of pre and post-test were 70 and 77.06 respectively, and standard deviations were 9.25 and 7.79 respectively. The ‘t’ value calculated indicates that the differences in these scores are significant between the pre and post-test as calculated ‘t’ value is 2.35. Hence, the Null Hypothesis is not accepted and concluded that there is a **significant difference** between the mean scores of the pre and post-test of the students in Science Learning by teaching through Constructivistic approach.

**Graph For Mean Values**
**Of the Pre Test and Post Test Scores Of Cheran Matric School**

**Achievements Scores of Students**

Table 2
Mean, standard deviation, calculated ‘t’ value of the pre-test and post test scores of the VII standard students of Vidhya Siksha Matric School in Dindigul district at the significant level of 0.05.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>‘t’ value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>20</td>
<td>72.4</td>
<td>13.55</td>
<td>2.549</td>
<td>Significant</td>
</tr>
<tr>
<td>Post Test</td>
<td>20</td>
<td>82.9</td>
<td>13.74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A Close look into the mean scores provided in table 4.2 indicates that the mean score of pre and post-test were 72.4 and 82.9 respectively, and standard deviations were 13.55 and 13.74 respectively. The ‘t’ value calculated indicates that the differences in this scores are significant between the pre and post-test as calculated ‘t’ value is 2.549. Hence, the Null Hypothesis is not accepted and concluded that there is a significant difference between the mean scores of the pre and post-test of the students.

Hypotheses 2

There is no significant difference between the means of the pre-test and post test scores of the Girls for the development of the constructivist approach for science learning using Constructivistic approach of the Cheran Matric Hr. Sec School in Dindigul district.

Table 3

Mean, standard deviation, calculated ‘t’ value of the pre-test and post test scores of the VII standard students of Cheran Matric Hr. Sec School in Dindigul district.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>‘t’ value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>13</td>
<td>70.85</td>
<td>8.65</td>
<td>2.11</td>
<td>Significant</td>
</tr>
<tr>
<td>Post Test</td>
<td>13</td>
<td>77.38</td>
<td>7.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Close look into the mean scores provided in table 3 indicates that the mean score of pre and post-test were 70.85 and 77.38 respectively, and standard deviations were 8.65 and 7.03 respectively. The ‘t’ value calculated indicates that the differences in this scores are significant between the pre and post-test as calculated ‘t’ value is 2.11. Hence the Null Hypothesis is not accepted and concluded that there is a significant difference between the mean scores of the pre and post-test of the students.
accepted and concluded that there is a significant difference between the mean scores of the pre and post-test of the Girls.

Table 4
Mean, standard deviation, calculated ‘t’ value of the pre-test and post-test scores of the VII standard girl students of Vidhya Siksha Matric School in Dindigul district.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>‘t’ value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>12</td>
<td>73.16</td>
<td>9.22</td>
<td>2.13</td>
<td>Significant</td>
</tr>
<tr>
<td>Post Test</td>
<td>12</td>
<td>81.5</td>
<td>14.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A close look into the mean scores provided in Table 4 indicates that the mean score of pre and post-test were 73.16 and 81.5 respectively, and standard deviations were 9.22 and 14.73 respectively. The ‘t’ value calculated indicates that the differences in these scores are significant between the pre and post-test as calculated ‘t’ value is 2.13. Hence, the Null Hypothesis is not accepted and concluded that there is a significant difference between the mean scores of the pre and post-test of the Girls.

4. Findings And Summary

Investigators constructed concept maps based on constructivist approach for science learning at VII standard level. There is significant difference between the means of the pre-test and post-test scores of the students on science learning using concept map in Vidhya Sikshaa Matric School and Cheran Vidhyalaya Matric. Hr. Sec. School. There is significant difference between the means of the pre-test and post-test scores of the Girls on science learning using concept maps in Vidhya Sikshaa Matric School and Cheran Vidhyalaya Matric. Hr. Sec. School.

4.1 Interpretation

The Research findings reveals the positive effect of constructivist approach in science learning where the same result was obtained by A.M. Ryan (2001) in his study on “The Effectiveness of constructivist science instructional methods on middle school students”. The same result was established by L.L. Liang and Gabel during 2005 on the study “Effectiveness of a constructivist approach to science instruction for prospective elementary teachers”.

4.2 Delimitation

This study is confined to only Dindigul geographical area. The experiment was conducted over four week’s period for 40 minutes per day. A longer period would give greater validity to the results and would eliminate some environmental factors. The longer period of time would ensure that the treatment of the study was the case of any change. The study is confined to VII standard science, learning based on concept map.

4.3 Educational implications

The results of the study implies that the development of science learning through constructivism strongly influence the achievement of the students in developing their knowledge in science understanding. The implications improve science learning and develop the creativity among
Dr. N. Devaki :: A Novel Knowledge Construction Through Constructivistic Approach For Science

students. This will help in catering individual difference in the abilities of the students. This will also help in giving uniform attention to all the students in the classroom. It provides opportunity for peer tutoring to both low and high achievers. Constructivism will make students accountable for the development of Science learning. Its limits the amount of written work and enhances creative works. The theory of constructivism has greater implication for contemporary classroom practice. Constructivist approach caters to paradigm shift in the basic process of education (ie). From” Teaching to Learn” to “Facilitating to know”. Hence, it warrants desirable changes in the academic performance of the students.

5. Conclusion

“Science Learning has influenced positively in the development of knowledge and skill through constructivist approach among secondary school students”. This study reveals that there is a significant difference in the achievement of the post-test over the pre-test of VII standard students in science due to exposure of constructivism on science learning. Science teachers and the practitioners can think of designing such type of classroom activities to teach science. Efforts can be made by the teachers especially students can eagerly find ways to create their own ideas through constructivist approach. They are required to work together to ensure that students are at the center-stage of their efforts and are given the best possible environment for their development of constructivism at homes and schools. However, it may be pointed out that inculcation of knowledge and skill on constructivism is not an overnight exercise. It may be inculcated in a day by day creative manner for the improvement and development of skill in science learning.

References