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The Effect of Concept Cartoon Method on Enhancing Achievement in Chemistry at Secondary School Level

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Abstract

Science education should aim at developing scientific values such as accepting truth, respect for evidence, seeking clarification, open mindedness and being objective in interpretation. Cartoons have a significant role in education to introduce remarkable and amusing activities for enhancing learning and student participation. The present study is under taken with the objective to compare the effectiveness of Concept cartoon method on enhancing achievement in Chemistry of students at secondary school level. Teaching Chemistry blended with Concept cartoon method is more effective than the prevailing method of teaching Chemistry.

Keywords: Concept Cartoon Method, Science education, Academic Achievement

Introduction

Science is an endless voyage of discovery, a continued venture in to the unknown, a quest to know and understand the world in which we live. It is an active field, constantly demanding willingness to make how observations, to repeat experiments, to consider new facts, and to challenge earlier conclusions. The current innovations in schools emphasize the process of science, the way in which the scientists advance their knowledge and solve problems. This would require meaningful attainment of knowledge, development of attitudes and value systems as well as mastery of skills required to effectively involve in scientific activities. This warrants a new outlook towards science education.

Science education should aim at developing scientific values such as accepting truth, respect for evidence, seeking clarification, open mindedness and being objective in interpretation. To achieve these learning outcomes, the teacher has to allow the students to construct their own concept, to work their own pace and provide all students with opportunities to engage in learning.

These objectives behind teaching of science as a core subject envisaged under the NPE (1986) can only be realized if our system of education addresses the problems which come in the way of development of scientific thinking, temperament and culture. The

National Focus Group on Teaching of Science (2006) in the position paper presented to National Council of Educational Research and Training (NCERT) has mentioned that there are three factors involved in science education; the learner (child), the environment - physical, biological and social (life) in which the learner is embedded, and the object of learning (science). One can regard good science education as one that is true to the child, true to life and true to science.

After more than twenty-five years since the recommendations regarding science education were made by the NPE, it is being realized today that modern educational technology is now capable of becoming a major resource for the delivery of educational services in most parts of our country. It has been shown that in comparison to traditional classrooms, technology supported classrooms have the potential to improve instructions (Idayavani& Shanthi, 2003). Beside the use of technology in education, enriching the teaching-learning settings with the use of new teaching methods, lessons will be more enjoyable. A well-designed visual model or an approach which supports learners autonomy to help them to understand the meaning of a concept related to information and communication technology in depth helps learners to

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construct and interpret concept in a concrete way. In teaching concepts related to ICT, visualization has a key role for learners in simplifying and conceptualizing what is taught in classroom.

Cartoons have a significant role in education to introduce remarkable and amusing activities for enhancing learning and student participation. They are used along with other innovative avenues to learning Chemistry which include plays, poems, puzzles, games, songs, proverbs, famous quotations, biographies, and even literary references. Cartoons are valuable aids that instigate interest and foster genuine student engagement in the classroom. A simple image can often change the tone and the dynamics of a group by imparting a little humor. New ideas, concepts and attitudes can be introduced with the help of cartoons.

The fact that cartoon has an aspect of humour attracts the attention of the students who are easily bored in learning settings and continuously look forward to some joy. Cartoon and humour, by preventing the students from getting bored of the lesson, enables them to be concentrated on the lesson longer and makes the more difficult lessons be loved by them. Cartoon and humour can even be preferred for conceptualizing and making sense of information and communication technology concepts accepted as tricky and abstract.

Concept cartoons are interest-arousing and surprising drawings in the form of a cartoon in which each cartoon character defends different viewpoints concerning a happening in daily life. Concept cartoons are visual tools composed of three or more characters' proposing ideas, discussing or thinking on a subject, an incident or a concept in daily life. Concept cartoons show different specialties from ordinary cartoons. While cartoons are used to make people laugh, concept cartoons are used to entertain students and make them inquire their knowledge.

Need and significance of the study

The secondary education is a very crucial stage in the life of a child. The child's spontaneity, curiosity, creativity and activity in general should not be restricted by a rigid and unattractive method of teaching and environment for learning. Science if studied properly, develops power of thinking reasoning, curiosity, open mindedness and ultimately develops scientific attitude or scientific temper.

Present education system demands new techniques in teaching and learning process. Today students expect joyful environment in the classroom for learning with interest and attention because media has attracted them very many ways with variety of programs. In specific children are getting attracted to fun fulfilled programs. So, Teaching should not transform information from textbook to the students but it should make the students think critically and creatively by engaging themselves always in hands on experience or should make them active participants in learning. There are teachers who use artistic material in teaching learning to attract the students towards experiential learning. Teaching is an art where in various tools and techniques are employed to make the students learn better. A cartoon is one such material with which a teacher can provide joyful environment and also can make her/his students to think differently and encourage them to create something on their own. It is a visual media with lot of humor which can be either in the form of single picture or series of pictures, captioned or non-captioned. These are seen in magazines, newspapers, books, television etc.

Concept cartoons provide an appealing and non-threatening way to represent ideas. Pupils are more likely to be enthusiastic towards the activity to come and will then be more focused and receptive to learning. Concept cartoons not only help students have fun but also prompt them to question what they know.

Statement of the problem

The present study is under taken with the objective to compare the effectiveness of Concept cartoon method on enhancing achievement in Chemistry of students at secondary school level. This study may provide information that can be used by secondary school curriculum planners, educators and experts.

Hence the problem under investigation is entitled as "The Effect of Concept Cartoon Method on Enhancing Achievement in Chemistry at Secondary School Level"

Operational definitions

Concept cartoons

Concept cartoons are a visual representation of science ideas. The simple cartoon style drawings put forward a range of viewpoints about science ideas in situations that are designed to motivate and engage students and stimulate discussion of their ideas. Concept cartoons are a cartoon style drawing that put forward a range of viewpoints about an everyday event. (Chris Joyce 2006).

In this study Concept cartoons are strategic instructional devices which combine visual elements with the texts written in the form of dialogues and cartoon style drawings through humour and ICT integration which depicts science concepts

Variables of the study

Independent variable

1. Method of teaching with Concept cartoon.
2. Prevailing method of teaching.

Dependent variable

1. Achievement in Chemistry

Hypothesis of the study

Hypothesis formulated for the present study are the following.

- There is no significant difference in the effectiveness of Concept cartoon method on achievement in Chemistry over the existing method.
- There is no significant difference on achievement in Chemistry between boys and girls whoever is treated with Concept cartoon method.

Methodology

Experimental method is used for the present study. The pre-test post-test nonequivalent group design was employed in the present study. This method is used to determine and evaluate effect of Concept cartoon method on achievement in Chemistry of STD IX pupils.

Participants of the study

For the present study 100 students from intact class divisions at std IX who follows English as medium of instruction is selected. Experimental group consists of 50 students and control group consists of 50 students.

Instruments used

In the present study investigator made use of the following tools.

1. A standardized achievement test in Chemistry.
2. Lesson transcripts based on Concept cartoon method.
3. Lesson transcripts based on existing method.

Analysis and interpretation

The summary of mean comparison is given in Table 1

Table 1: The Result of the t-test Conducted for the Comparison of Mean Pre-Test (total), Post-Test (total) and Gain Scores (total) for Experimental and Control Groups

Variables		Total sample t value	Level of significance
Pre test	Total	1.35	Not significant
	Male	1.52	
	Female	0.25	
Post test	Total	5.82	Significant
	Male	6.33	
	Female	2.51	
Gain Scores		6.30	Significant

From the table 1 summary of t-values suggest that the t-values obtained for pre-test is found not significant at 0.01 levels and 0.05 level of significance. So performance of

Table 2: Summary of Analysis of Variance (ANOVA) of pre- test and post- test scores in the Experimental and Control Groups

Source of variation	df	SSx	SSy	MSx(vx)	Fx	MSy(vy)	Fy
Means- Among	1	9	392	9	1.67	392	33.79
Groups -Within	98	530	1137	5.40		11.60	

The table value of F at 0.05 level of significance is 3.94 and 6.90 at 0.01 level of significance. The calculated value of F_x was 1.67 which is not significant at both levels. So it is clear that the two groups do not differ in their pre-test. The calculated value of F_y was 33.79 which is significant at 0.05 level and 0.01 level. This means that the two groups differ significantly in the post-test. The means of post-test

experimental and control groups for total sample is similar in case of their pre experimental status of achievement measured in terms of a pre-test.

The value obtained for post-test for total sample is found significant .It can be seen from the results that performance of the experimental group is high compared to the control group.

The obtained t-value for the gain score for the total sample are found significant. There is significant difference in the performance of the experimental group and control group on the gain scores.

Analysis of covariance (ANCOVA)

Comparison of effectiveness of Concept cartoon based class over existing method the scores of experimental and control groups were subjected to analysis of covariance to determine the effectiveness of Concept cartoon-based class. Total sum of squares, mean sum of squares and F-ratio of the pre-test and post-test scores of the experimental and control groups were computed and given in the Table 2

Table 3:Summary of Analysis of Co-variance (ANCOVA) of Pre-test and Post-test scores in the Experimental and Control Groups

Source of variation	df	SSx	SSy	SSxy	SSyx	MSyx	SDyx	Fyx
Among-Group Means	1	9	392	61	283	283	2.68	39.52
Within-Group Means	97	530	1137	484	695	7.16		

The calculated value of F_{YX} ratio was 39.52. The table value of F is 3.94 at 0.05 level and 6.90 at 0.01 level. From this it was clear that the two-final means, which depends upon the experimental and control variables differ significantly, after giving treatments, at 0.05 level and 0.01 level. This difference happens after they have been adjusted for initial difference. Thus, null hypothesis is rejected at

scores of achievements is adjusted with pre-test mean and ANCOVA is applied to the adjusted mean to determine whether the adjusted mean differ significantly. The summary of ANCOVA of pre-test and post-test scores of students in experimental group and control group are given in Table 3.

both levels.

The adjusted means of post-test scores (Y mean) of students in the experimental and control groups were computed. The difference between Y means was tested for significance. The data for adjusted mean for post-test scores in experimental group and control group are given in Table 4.

Table 4: Adjusted Means of Post-test scores in the Experimental Group and Control Group

Groups	N	M_x	M_y	M_{xy}	SED	t
Experimental	50	8	18.24	17.96	0.56	6.34
Control	50	7.38	14.28	14.56		

The investigator used t-test for determining the significance of difference among adjusted means. It helped to conclude about the differences generated through varying treatment after partialling out the initial differences.

The table value of t-value at 0.05 and 0.01 level of significance is 1.96 and 2.58 respectively. Since the calculated t-value 6.34 is greater than 2.58 at 0.05 level and 1.96 at 0.01 level of significance, the difference between performances of the two groups differ significantly. The significantly great adjusted Y means of the experimental group than the control group indicates that experimental

group is superior to control group.

From the analysis of the total scores of pupils in experimental and control groups by using the statistical technique of analysis of co-variance (ANCOVA), it is evident that teaching through Concept cartoon-based class is more effective than the existing method-activity method of teaching.

Major findings

The major findings of the present study are given briefly under the following heads

Effect of concept cartoon method on academic achievement in Chemistry

Teaching Chemistry blended with Concept cartoon method is more effective than the prevailing method of teaching Chemistry. This conclusion is supported by the following findings.

- When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant. The obtained t-value was 5.82 which is significant at 0.05 and 0.01 level of significance. Mean for experimental group is 18.24 and mean for control group is 14.28.
- When the post-test scores of males in the experimental group and control group were compared, the difference between their mean was found to be statistically significant. The t-value obtained was 6.33 which is significant at 0.05 and 0.01 level of significance. Mean for the experimental group was 18 and the mean for control group was 12.81.
- When the post-test scores of females in the experimental group and control group were compared, the difference between their means was found to be statistically significant. The t-value obtained was 2.51 which is significant at 0.05 (1.96) level of significance. The experimental group is superior to the control group. Mean for experimental group was 18.43 and mean for control group was 15.87.
- When the gain scores of pupils experimental and control group were compared, the difference between their means was found to be statistically significant. The t-value obtained was 6.30 which is significant at 0.05 and 0.01 level significance. The experimental group was found to be superior to the control group. Mean for the experimental group was 10.24 and mean for the control group was 6.9. The analysis of covariance in pre-test scores and post-test scores of the experimental and control group showed significant difference between the two groups. The obtained F_{YX} is 39.52 which is significant at 0.05 and 0.01 level significance. The difference between adjusted mean of post-test scores of experimental and control groups were tested for significance and t-value obtained was significant. The experimental group was found better than the control group in achievement.

From the above findings it can be concluded that teaching Chemistry with Concept cartoon method is effective in upscaling achievement in Chemistry among the pupils at secondary level.

Tenability of hypotheses

Based on the major findings, the tenability of the hypotheses set for the present study was examined.

Hypothesis 1

- ❖ There is no significant difference in the effectiveness of Concept cartoon method on total achievement in Chemistry over the existing method.
- From the results of analysis of covariance in pre-test and post-test scores of experimental and control groups showed the significant difference between two groups. The difference between adjusted mean of post-

test scores of experimental and control groups were tested for significance and t-value obtained was significant. From these it is evident that teaching through Concept cartoon method is more effective than existing method of teaching. So, Concept cartoon method is more effective method in teaching Chemistry among secondary school students. Thus hypothesis 1 is rejected.

Hypothesis 2

- ❖ There is no significant difference on achievement in Chemistry between boys and girls whoever is treated with Concept cartoon method.
- The result of the study shows the significant difference in mean scores of academic achievements in Chemistry between the subsamples based on gender and for total sample. This shows that the students taught through Concept cartoon method is significantly higher in academic achievement than the student taught through existing method of teaching. Thus hypothesis 2 is rejected

Educational implications

The analysis of data has proved that Concept cartoon method in teaching Chemistry is more effective than the existing method in the academic performance in Chemistry. On the basis of these following suggestions are made. They are,

- Computer aided graphics and cartoon drawings help the learner in getting motivation to learn.
- Concept cartoon method provide an appealing and non-threatening way to represent complicated ideas. Difficult concepts can be easily represented through cartoon method, complicated problems can be easily made clear and can develop interest at the end of the topic without dropping anxiety.
- The activities are involved with cartoon drawings and video lessons. Pupils are always enthusiastic and these lead to vibrant class discussions. The lessons thus become more interactive and student-centred as pupils are actively in their learning.
- The study reveals that ICT as well as humour based classes are very useful to both high and slow learners. Thus, Concept cartoon method should be promoted for conceptual attainments.
- The retention capacity can be increased if learning is provided in the form of audio-visual media. Drawing the attention of the learner to a particular point is an important aspect of learning. Use of different types of graphical display helps to attract the attention of the students on the desired points, concepts and terminologies.
- It was found out that cartoon is an effective tool in conveying the required message to the students with the purpose of education. The importance of using cartoons in education is increasing day by day. A cartoon can be used as a learning facilitator element in education.

Investigator feel gratified if the findings of the study lead to better understanding in teaching learning process and to motivate the researcher in order to undertake further studies in this scenario.

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