Available on https://www.gyanvihar.org/researchjournals/ctm_journals.php
SGVU International Journal of Convergence of Technology and Management
E-ISSN: 2455-7528
Vol.10 Issue 2 Page No 155-161

A Development of lesson plans on constructivist approach in science at elementary level

[1] Dilip Sharma, [2] Dr. Vibha Kaushik
[1] Research Scholar, Department of Education. Suresh Gyan vihar University, Jaipur
[2] Supervisor, Department of Education. Suresh Gyan vihar University, Jaipur

Abstract

The current study is not heavily influenced by teacher-centered lecture methods that target conventional classroom instruction that adheres to a carefully thought-out lesson plan. Students' roles become passive because there isn't a lesson plan in the classroom. Using the 7 E constructivist approach, this study investigated possible contributors to lesson plans and created an effective lesson plan strategy. This study investigates possible sources for lesson ideas and develops an experimental strategy policy for successful lesson plans. In P.P.L. International School's science lesson plan for class 7, an experimental method was used, and surveys were administered in various classes within the same Bharatpur school. The topics under discussion in this paper are 1) To develop 7E model lesson-plans based on constructivist approach in relation to science at elementary level. Thirty students who were taught using the 7E construction approach lesson plan in the classroom were chosen as a sample for this study by the researcher.

Key Words- Constructivism, 7Es Model, Teaching of science, Elementary Level

Introduction

We have had constructivist classrooms for as long as there were people asking each other questions. Constructivism is the study of learning, and it remains true that this movement is about how we all interpret the world - **Jacqueline Gernnan Brooks.**

The conventional pedagogical practices of teaching emphasize learning answers over question exploration, memory over critical thought, bits and pieces of information instead of context understanding, and reading instead of doing—that is, they are ineffective for achieving the goals of teaching science as outlined in NCF-2005. For these reasons, constructivist approaches are required in education at all levels. The traditional methods of teaching and learning that are employed in schools, particularly in science classes, push students to commit general knowledge—such as laws, formulas, or theories—to memory and require them to repeat it during tests. As a result, learners have very little opportunity to acquire insightful knowledge and cultivate abilities like critical thinking and problem solving. Constructivism-based learning supports students' intellectual, social, and psychological growth and prepares them to apply it in a variety of contexts. In a constructivist classroom, students have the chance to work, observe, investigate, engage, ask questions, and express their expectations to everyone. In a study conducted later in investigated the impact of a constructivist approach on the creativity of elementary school students. They discovered that this approach outperformed traditional instruction in stimulating students' creativity and piqued their interest in Science. Constructivism's epistemology differs from previous knowledge because it views prior knowledge as objective, inert facts or information. Knowledge, in the view of this new philosophy, is pluralistic, subjective, and actively constructed by the learner during the process of creating meaning within their social and cultural environment. Hence, in a constructive science classroom, there should be plenty of opportunities for students to apply the constructivist approach. This is necessary because conventional educational techniques place too much emphasis on memorization over critical thinking, emphasize learning answers over question exploration, and emphasize reading instead of doing. These methods make it difficult to meet the objectives of teaching science as outlined in the NCF-2005. The traditional methods of teaching and learning that are employed in schools, particularly in science classes, push students to commit general knowledge—such as laws, formulas, or theories—to memory and require them to repeat it during tests. As a result, there is very little opportunity for learners to acquire critical thinking and problem-solving abilities. Learning within the constructivism framework helps students develop their intellectual, social, and psychological skills so they can apply them in various contexts. Opportunities to observe, work, explore, interact, ask questions, and share expectations with others are presented in a constructivist classroom. A study to determine the impact of a constructivist approach on primary school students' creativity. They discovered that this approach outperforms traditional instruction in stimulating students' creativity and piquing their interest in Science. Constructivism has a distinct epistemology since prior knowledge is viewed as objective, inert facts or information. This new philosophy holds that knowledge is pluralistic, contextual, and subjective in nature, actively created by the learner as they make sense of the world in their social and cultural context. As a result, give students plenty of opportunities in a constructive science classroom to learn science in line with its nature. Additionally, M. Cakir suggests that a constructivist approach can be used to address student misconceptions. Students in the VII standard saw improvements in their science achievement, science process skills, and scientific attitude as a result of the constructivist approach. In fact when it gives students/learners the opportunity to actively participate in the construction and reconstruction of knowledge; traditional classrooms also have a constructive approach. Identified various activities,

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com

such as concept mapping and T-charts that can be implemented in a constructivist biology classroom. Additionally, he emphasized how important group discussions and brainstorming are in constructivist classrooms. Constructivism has a very significant positive role in the pedagogy of science teaching that can develop students' problem-solving skills, critical and reflective thinking, creativity, and scientific attitude. This is inferred from a discussion of the above-mentioned research findings.

Constructivism

Constructivism is a theory that explains how each learner builds their own knowledge from experience. According to Piaget (1971), constructivism is a framework for explaining how different learners adjust and improve their knowledge. Constructivism is a relatively new paradigm that operates under the presumption that knowledge is contextual, subjective, and fundamentally incomplete. It flatly rejected the conventional objectivist understanding of knowledge. While constructivism emphasizes learner beliefs' resilience and the social construction of reality, traditional teaching-learning practices, grounded in objectivism, portray knowledge as authoritative and certain. The paradigm changed from behaviourism to cognitive theory with constructivism. The epistemology of behaviourists is cantered on intelligence, goal domains, knowledge levels, and reinforcement. Constructivist epistemology, on the other hand, makes the assumption that students create their own knowledge through interactions with their surroundings. The foundation of what we call "constructivist learning" is four epistemological presumptions. The first is that students who engage in active learning physically construct knowledge. The second way that knowledge is created is symbolically by students creating their own representations of actions; the third way is socially constructed by students communicating their meaning-making to other students; and the fourth and final way is theoretically constructed by students attempting to explain concepts they don't fully understand.

Historical background of constructivism

The idea of constructivism originated in Socrates's dialogues with his disciples in classical antiquity. Through directed questioning, Socrates helped his students identify their own cognitive shortcomings. Although it has evolved into a 21st-century philosophy, the Socratic dialogue is still a crucial tool used by constructivist educators to evaluate their students' learning and design new learning experiences. Lev Vygotsky, Bruner, David Ausubel, and Jean Piaget all played major roles in the development of this philosophy. According to Jean Piaget, who is credited with founding individual constructivism, a learner's developmental stages have a significant impact on their ability to learn. Subsequent philosophers believed that social interaction is the means of acquiring knowledge. The learner then progresses through distinct phases of their physical, intellectual, emotional, and social development. Each phase is linked to particular learning experiences that specify what and how much the learner can learn from those experiences. Dewey and Vygotsky acknowledged that group context was fundamental to the formation of knowledge (Oxford, 1997). According to Vygotsky's theory, learning is social in nature and happens through interactions with other people, such as between students and their peer groups as well as with teachers. Meaning is shared, information is exchanged, and the learner has the chance to compare, examine, and redefine his or her knowledge with that of other group members during this interactive process. The notion of the learner, which behaviorist psychologists once viewed as a "subject," is fundamentally altered by all these learning theories, which now see the learner as a "active participant" in the learning process, capable of actively creating meaning for themselves. Constructivist educational methods have been studied, written about, and implemented by contemporary educators such as John D. Bransford, Martin G. Brooks, Eleanor Duckworth, George Forman, Roger Schank, and Jacqueline Grennon Brooks.

Purpose of the study

Activities help students learn in an efficient and lasting way, especially when they are young. Taking into account this idea that we saw in everyday life, the researcher gets interested in identifying a teaching approach that helps students achieve more. Either the constructivist teaching approach is superior, or the traditional teaching style is effective. The researcher carried out this experimental study to determine the impact of a constructivist teaching approach on the science achievement of seventh -grade students in order to answer this question.

Objective of the study

To develop 7E model lesson-plans based on constructivist approach in relation to science at elementary level.

Literature Review

Dr. Shalini Sharma(2023): In conclusion, the constructivist method offers ample opportunity for students to actively participate and engage with teachers and peers in the classroom. Low achievers can have greater opportunities to learn new things and improve their performance through interaction. One hundred and twenty secondary school students from government schools in the Shaheed Bhagat Singh Nagar district of Punjab, India, made up the sample. The results showed that although the 7E learning model based teaching strategy had a positive effect on students in the experimental group with varying levels of science self-efficacy, the students in the high science self-efficacy group benefited most from it.

Ruchi Singh &Dr. Laxman Shinde (2023): The traditional method of instruction is widely used. It disregards the need of the subjects and students, the environment in which the instruction is taking place, and the students' mental state of interest. One of the newer tendencies is constructivism, which emphasizes creativity and learning more and more. It appears more practical to teach math to eighth-grade students using the constructivist method, and it is also more practical to involve the students in creative and innovative activities.. This study compares the traditional method of teaching mathematics at Maharishi Vidhya Mandir and Mizpah Christian School Orai with instructional materials based on constructivist approach (7E's learning model). Pre- and post-test results were used to compare the two groups. The significance of the difference between the experimental and control groups was assessed using the t-test following the experiment. It is investigated that prior to the experiment, both groups' achievement scores in teaching mathematics to eighth-grade students were unequal, but following the experiment, both groups' achievement scores changed.. It is concluded that the experimental group's noteworthy performance could be attributed to the constructivist approach to teaching used with the students in the group.

Operational definitions

Constructive approach: -

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com

The idea of a constructive approach is what makes unique and creative ideas come to life. It is the cognitive capacity to provide a fresh viewpoint and thus create something new. As creativity is related to conceptualizing different ideas, which is an easy way to solve problems by using multiple points of view and openly utilizing creativity and ingenuity, constructive thinking is related to the ability to recognize and formulate original and different solutions to problems. Workable with an end to questions.

Lecture method: -

The official, oral delivery of knowledge or other content by a teacher to a class of students or other learners. When there is a lack of time or a large group, the lecture method is typically employed. It can also be used to introduce different teaching strategies, like role-playing or audiovisual presentations, or to summarize content created in other ways.

Achievement in science:-

Achievement is the fulfilment of goals such as application, comprehension, knowledge, and skill. An achievement test that covers all of the aforementioned goal levels in the chosen content was created by the researcher. A scientific achievement is something that has been made in the field of science education. According to the results of the senior secondary students' objective science test, science achievement in this study is defined as their performance in the subject. The total score that the students receive on the achievement test that the researcher designed represents their achievement in science in the current study.

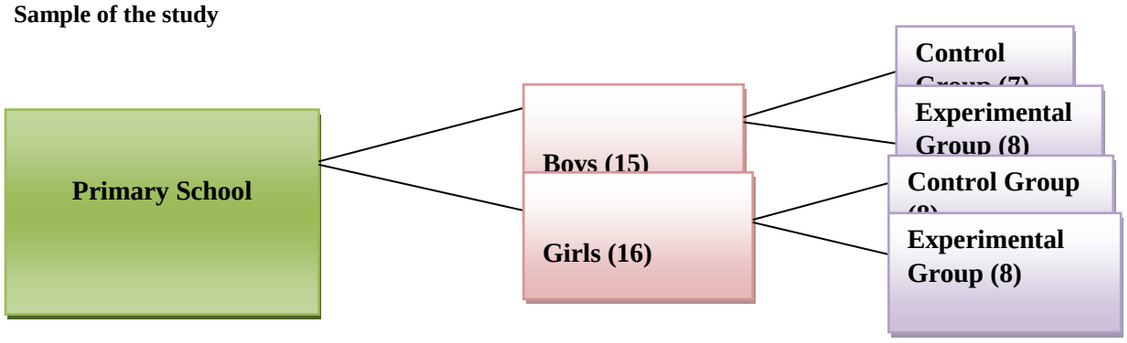
Science student: -

Practical concepts and elements of scientific theory are included in science stream subjects. These courses help students develop their analytical and problem-solving skills in addition to providing them with a thorough understanding of the physical, chemical, and biological aspects of the universe. Topics aid in comprehending how both natural and artificial processes affect the planet. There are thus numerous career options for students who select the Science stream. Following your study of science, you can pursue a variety of career paths, including bioinformatics, dentistry science, space exploration, computer science, metallurgy, pharmaceuticals, biotechnology, nanotechnology, mechanical engineering, and forensics.

Sample and sampling techniques:

The primary schools in the Bharatpur, Rajasthan, district made up the study's population. Convenient sampling techniques were employed to recruit study participants because they are useful for short-term research projects. A primary school in an urban area was chosen for intervention. Thirty boys and girls made up the sample. Students were split up into two groups: control and experimental. Each group consisted of fifteen students: the experimental group had eight boys and seven girls, while the control group had eight boys and seven girls.

Sample of the study



Procedure for intervention and gathering data The head of the school was consulted before any data was taken. To all of the participants and their teachers, the researcher herself described the aim of the study. Through the use of balloting, a portion of grade seven students was randomly chosen and divided into two groups (experimental and control). Constructivist teaching, which emphasizes learning through activities, was used with the experimental group of students. Conversely, students in the control group experienced no variation in their instruction or learning process. A lecture format was used to instruct them. The intervention was conducted six days a week for a duration of two months. Each class's intervention lasted for forty-five minutes. Data from each respondent, whether they were in the experimental or control group, was gathered using a test that the respondent created themselves. Enough time was provided to each research participant to complete the assessment.

Discussion and Analysis

The researcher used inferential statistics, such as an independent sample t-test and a dependent sample t-test, to examine the
data and highlight the mean difference in the students' scores for the experimental and control groups.

Role of the teacher in constructivist science lesson plan

In constructivist science education, both the traditional roles of the teacher and the students are being redefined. The objectivist perspective of knowledge, which is predicated on the idea that knowledge is complete, universal, and objective and that it can be transferred from the head of the teacher to the head of the student, forms the basis of the teaching strategies employed in traditional classrooms. The role of the student in constructivist teaching changes from knowledge acquirer to knowledge constructor, and the role of the teacher changes from transmitter of knowledge to facilitator of knowledge construction. The classroom is not a "authoritarian" setting where the teacher, who is regarded as a subject matter expert, has absolute power and is only responsible for imparting knowledge to the passive students who stand there like empty vessels waiting to be filled. With this method, the classroom atmosphere is far more democratic, students are encouraged to ask questions, and the teacher sincerely welcomes and pays close attention to their ideas and prior knowledge. Teachers give students the chance to freely discuss and share ideas with one another while also probing, conducting their own experiments, and engaging in other problem-solving activities. The National

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com

Curriculum Framework (2005) suggests that curricula should assist students in becoming knowledge builders and highlights the active role of teachers in this process by involving students in the learning process through carefully selected assignments and questions. "In a constructivist classroom, the teacher searches for students' understanding of the concepts and then structures opportunities for students to refine or revise these understandings by posing contradictions, presenting new information, asking questions, encoring research, and/or engaging students in inquired designed to challenge current concepts," according to Brooks & Brooks (1999). Therefore, in a constructivist science classroom, the teacher is not the wise man on stage but rather a mentor or guide by the students' side, creating learning environments for the engaged science learner rather than imparting knowledge to the docile student.
Educators need to be aware of the following ten fundamental constructivist thinking guiding principles:

1) Constructing meaning is an active process of learning for students.
2) Learning occurs when people use language;
3) Learning is a social activity;
4) Learning is contextual;
5) Learning is mental;
6) Everyone needs knowledge to learn;
7) Learning is not the passive acceptance of knowledge; rather, it requires effort. A key component of learning is motivation, and
8) Learning takes time.

Constructivist models

Robert Karl's presented a teaching/learning model for instruction in the early 1960s that was based on Piaget's work and represented a methodical integration of psychology into science education materials. A variety of constructivist models are at one's disposal for creating learning experiences that are appropriate for students. In science classrooms, Roger Bybee's 5/7 E's model is a convenient implementation. The Biological Science Curriculum Study (BSCS) project was used to develop this model. Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend are the 7 "Es" that are used. Each of the seven "E"s represents a stage of learning, and these 7 "Es" can also be explained as

Topic: TRANSPORT OF SUBSTANCES IN PLANTS

Concept Mapping:

General Objective:

1. Students will recognize the structure of plants that are in bloom..

2. Students will be able to sketch and identify the various plant parts.

3. Students will apply their biology class knowledge of the transport of subs.

4Students will analyze various tissue system types.

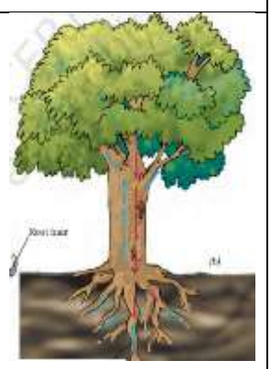
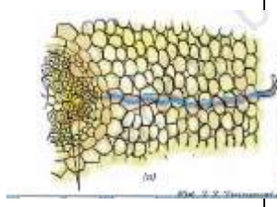
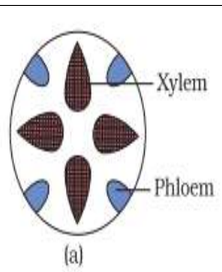
5. Students will assess the flowering plants' anatomical features.

Approach: Constructivist (7 E Model)

Method: Demonstration cum Explanation

TIME	STEPS	TEACHERS ACTIVITIES	STUDENT ACTIVITY	TLM
3 Min	Elicit	Student's will ask questions 1. What is a cell? 2. What is a tissue?	Learn will give answer	

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com

		3. What is the basic fundamental unit of plant?		
2 Min	Engage	Plants take water and mineral nutrients from the soil through the roots and transport it to the leaves. The leaves prepare food for the plant, using water and carbon dioxide during photosynthesis. that food is the source of energy and every cell of an organism gets energy by the breakdown of glucose. The cells use this energy to carry out vital activities of life. Therefore food must be made available to every cell of an organism. **Transport of water and minerals** Plants absorb water and minerals by the roots. The roots have root hair. The root hair increase the surface area of the root for the absorption of water and mineral nutrients dissolved in water. The root hair is in contact with the water present between the soil. Plants have pipe-like vessels to transport water and nutrients from the soil. The vessels are made of special cells, forming the vascular tissue. A tissue is a group of cells that perform specialised function in an organism. The vascular tissue for the transport of water and nutrients in the plant is called the xylem		 
5 Min	Explore	Also, students in the class are provided with some more information about The root hair increase the surface area of the root for the absorption of water and mineral nutrients dissolved in water. The root hair is in contact with the water present between the soil particles.	Notes down their reading in the classroom teaching	
10 Min	Explain	Students explain about anatomy of flowering the plants.	Discusses with peer to get the answer to the leading questions	
20 Min	Elaborate	Students are asked to elaborate on: 1. Why the cells are mostly is diametric? 2. What are the 4 organs common to all flowering plants? 3. What is the female organ of the flower?	Justifies their observation, learns new definition of flowering plants and solves problems.	
5 Min	Evaluate	Students' responses and answers are checked.		
2 Min	Extend	Student will ask them to find the difference between cells and tissue and draw their well labelled diagram.		

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com

Fig. 12.4 *Leaf of Bryophyllum with buds in the margin*

Activity 12.3

(To be demonstrated by the teacher)
Take a piece of yeast cake or yeast powder from a bakery or a chemist shop. Take a pinch of yeast and place it in a container with some water. Add a spoonful of sugar and shake to dissolve it. Keep it in the warm part of a room. After an hour, put a drop of this liquid on a glass slide and observe under a microscope. What do you observe? You may see the formation of new yeast cells (Fig. 12.5).

Chain of buds

Activity:- Students will discuss with peer to get the answer to the leading questions

S.No	Name of the Chapter	Content	PG. no	Values
1	**Plants**	**Transport of substances in plants**	**77**	**Search for information, critical thinking, civility, collaboration, intellect,**

Chapter – 7 Transport of Substances In Plants

Analysis of distribution scores of experimental and control groups.

Table

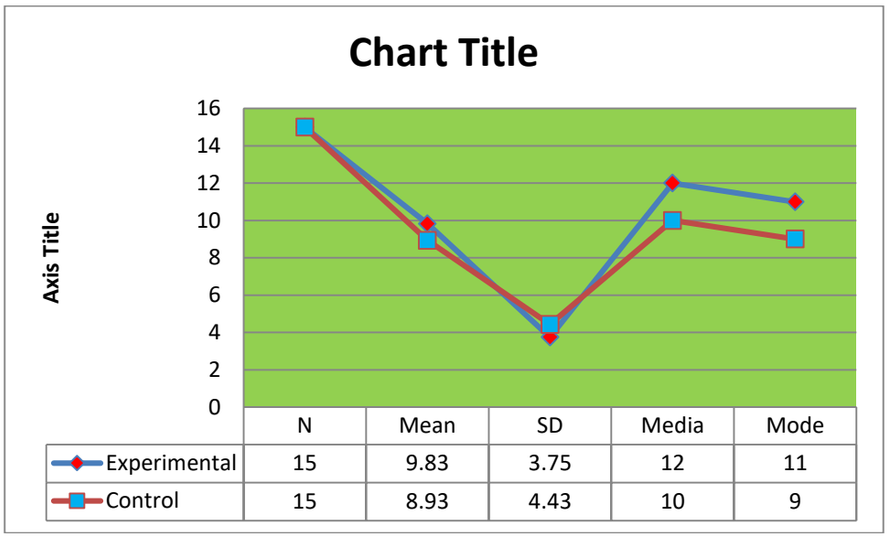
Groups	**N**	**Mean**	**SD**	**Media**	**Mode**
Experimental	**15**	**9.83**	**3.75**	**12**	**11**
Control	**15**	**8.93**	**4.43**	**10**	**09**

Explanation

The Mean, Median and Mode of experimental and Control scores of boys and girls vary little bit. Shows that the sample selected is approximately normal for both Experimental and Control groups. Standard deviation also shows that the sample is almost homogenous with regard to the Pre-test and Post-test scores on learning ability.

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com

Learning Ability of the Experiment and Control groups



	N	Mean	SD	Media	Mode
Experimental	15	9.83	3.75	12	11
Control	15	8.93	4.43	10	9

Conclusion

Science education is now the most important part of the curriculum. In modern Indian science classrooms, the traditional methods of teaching science only transfer knowledge from the teacher's head to the students' head. In this context, science is viewed as a body of knowledge only, and the end product is valued more highly than the methodological aspects of the discipline. These traditional approaches prove ineffective in helping children acquire true scientific knowledge and comprehension, and they are also ineffective in helping them practice critical, analytical, and problem-solving skills. As a result, we must immediately change our teaching methods to comply with NCF-2005's recommendations. Within this framework, a child is seen as a "discoverer," actively creating his own knowledge and understanding through the process of meaning-making. As a result, the framework supports the application of constructivism in science education at all levels. Numerous studies show that constructivism promotes learners to actively make sense of their own knowledge by reflecting on and challenging it. Constructivism is therefore beneficial to learning science in the truest sense—that is, as a process for understanding the world around us as well as a body of knowledge. The focus of this model is now on the "students" rather than the "teacher." Teachers now have to take on the role of "facilitators" of learning rather than acting as sages on stage. Students are now active learners who create their own knowledge via experience, observation, documentation, analysis, and reflection. They are no longer only passive recipients of knowledge. The Roger Bybee-developed 5/7 Es model is the most suitable constructivist model out of all those that are currently available. The researcher has framed a typical lesson plan based on the 7Es, which is an attempt to design a learning strategy for a science classroom that follows the VII standard. This plan can prove useful in achieving the main objective of constructivism, which is to teach the students how to learn in the science class. Hence, when the class seven students were taught through the 7Es lesson plan, the researcher helped the students to understand the science subject more.

REFERENCES

1. Brooks, J.G. & Brooks, M. (1999). In Search of Understanding: The Case for Constructivist
2. Cakir, M. (2008). Constructivist Approaches to Learning in Science and their Implication for Science Pedagogy: A Literature Review. International of Environmental & Science Education. Vol 3. (4). 193-206.
3. Constructivism learning theory retrieved on 8/3/2013 from www.prainbow.com/cld/cldp.html
4. Dogra, B. (2010). Constructivist Classroom Activities for Biology Learning; Journal of Indian Education ; No. 2
5. Dr. Sunita Singh *, Sangeeta Yaduvanshi (2015). Constructivism in Science Classroom: Why and How ; International Journal of Scientific and Research Publications.
6. Education. Journal of Indian Education. Nov.2009. NCERT, New Delhi
7. Enhancing Education: The 5 E'S retrieved on 20/1/2014 from enhancing ed.wgbh.org/research/eeeee.htm/
8. Kim, B. (2006). Social Constructivism. Retrieved from http//www. coe.uga.edu/epltt/Social Constructivism.htm at 16/11/2014.
9. Kumar Rajesh and Gupta V.K. (2009): An introduction to cognitive Constructivism in
10. Nayak, R.K. & Senapaty (2009). Effect Constructivist Approach in Fostering Creativity of Primary School Children, Journal of Indian Education; No. 2
11. Ocean Motion: Teachers: The Five E's model retrieved on 20/1/2014 from oceanmotion.org/htm/teachers/five_e.htm
12. Santrock, J. W. (2006). Educational Psychology, Tata McGraw- Hill Publishing Company Limited. New Delhi
13. Sridevi, K. V. (2008). Constructivism in Science Education; Discovery Publishing House, Pvt. Ltd. New Delhi.
14. Warrick, W.R. Constructivism: Prehistorically to Post-modern, Ph.D. Portfolio, George Meson University.

Correspondence to: Vibha Kaushik, Department of Education, Suresh Gyan Vihar University, Jaipur
Corresponding author. E-mail addresses: vibha.kaushik@mygyanvihar.com