ORIGINAL RESEARCH PAPER

Education

ENHANCEMENT OF SCIENCE PROCESS SKILLS THROUGH COGNITIVE CONSTRUCTIVIST APPROACH

KEY WORDS: Cognitive Constructivist approach, Science Process Skills, Facilitator, Information Processing, sensory inputs, symbol structures.

RM. Kalyanasundaram Research scholar in Education Department of Education (DDE) Alagappa University Karaikudi

Dr.P.Sivakumar Professor & Head i/c Department of Education (DDE) Alagappa University, Karaikudi

ABSTRACT

To develop the ability of thinking among the learners on par with scientist a scientific approach is inevitable in teaching and learning process. Cognitive constructivist approach provides an opportunity for the learners to carryout various activities as like that of scientist. According to cognitive constructivist per view the learners has to build their own understanding of new ideas based on their pre - existing cognitive structures. In learning science, the process skills signify the acquisition of applicable skills through the content. Cognitive constructivist approach is an explanatory vehicle to acquire science process skills. In this paper an attempt has been madeto d iscuss about cognitive constructivist strategy to develop science process skills.

INTRODUCTION

The inculcation of ability to think among the students is indispensable. The science and technology has rapidly advanced and the increasing demands for more and more number of scientists to meet over the arousing domains of science related activities has accelerated the need for expanding scientific approach in the teaching as well as the learning process. Traditional method of teaching in school is teacher centered and highly authoritarian. Teachers fill the students with layers of various information and students are expected to memorize the given information. The current revolution in field of teaching science all over the world leads to a major change in the method of presentation in such a way, to enhance scientific knowledge among the learner and the learning activities should be focused on the skills to be learned and presented.

The philosophy about learning proposes that the learners need to build their own understanding of new ideas and it has been labeled as constructivism. Much has been written by many eminent leaders after their research in the fields of learning theory and cognition. scholars such as Jean Piaget, Eleanor Duckworth, George Hein and Howard Gardener have explored these ideas in a detailed manner.

Constructivism is a set of assumptions which deals about the nature of human learning that guide constructivist learning theories and methods of teaching in education. Constructivism as a description of human cognition is often associated with pedagogic approaches and activities that promote learning by doing. According to the constructivist way of teaching, the teachers are learning facilitators and instructors, and learning is a process by which knowledge is constructed. Learners can actively construct their own knowledge by connecting new ideas to existing ideas on the basis of the available materials and activities presented to them. Constructivism is a continuum and it has been divided into three broad categories cognitive constructivism, social constructivism and radical constructivism.

SCIENCE PROCESS SKILLS

A set of skills required by learners to learn science concepts and aid the achievement engraved in learner's brain, which are possible to be transformed into analogous/ similar situations across the subject domain. It includes both basic and integrated science process skills. The basic skills include observing, inferring, classifying, measuring, communicating and predicting and the integrated skills include controlling variables, defining operationally, formulating hypotheses, interpreting data, experimenting and formulating model. Science process skills signify the acquisition of applicable skills through the content and applying the acquired skills in achievement of selected content.

COGNITIVE CONSTRUCTIVISM

Jean Piaget and William developed a cognitive approach that focused on mental processes rather than observable behavior. Common to most cognitivist approaches is the idea that knowledge comprises symbolic mental representations, such as propositions and images, together with a mechanism that operates on those representations. Knowledge is seen as something that is actively constructed by learners based on their existing cognitive structures. Cognitive Constructivism is typically associated with information processing and its reliance on the component processes of cognition. Information processing approaches to learning regard human mind as a symbol processing system. This system converts sensory inputs into symbol structures and then processes those symbol structures, so knowledge can be held in memory and retrieved.

IMPORTANCE OF COGNITIVE CONSTRUCTIVISM

In the last years constructivism as an approach in education has a central position in didactical literature. The number of scientific articles and books on constructivism as a theory and as an approach in the education is huge. Constructivism has become the most valuable guiding principle for the teachers of science, as well as for researchers in this field' An important component of contemporary education in all school subjects is incorporation of constructivist training and to minimizes the traditional training. In traditional training teacher presents educational information to students; students are passive learners and they receive mainly knowledge about facts. Constructivist training (training based on constructivist approach) stimulates students'activity in the process of learning the lessons. Constructivists teaching promote critical thinking and motivation among learners.

SCIENCE PROCESS SKILLS AND COGNITIVE CONSTRUCTIVISM

Arredondo & Block (1990), looked at the efforts of two school districts that had successfully integrated mastery learning along with the thinking skills into their curriculum. Both districts began their integration in the early 1980s and spend considerable time deciding on the specific content to be taught and evaluated. Each district had shown considerable increase in achievement while at the same time, students had been provided with the basic framework necessary to connect one fragment of instruction with another (Smith, 1989).

By implementing mastery learning programs in the basic skills areas, the academic foundation for success in the twenty first century can easily be reached by the vast majority of our student population as reported by Department of labours Secretary's Commission on Achieving Necessary Skills (SCANS, 1991). Dirks and Cunningham (2006), did a research with an aim to teach students science process skills that they believed were needed for success in the introductory biology courses. The skills were taught using Scaffolding approach, that progressively challenge students to master the skills, while weaving them together through individual, homework assignments and small group work in class. Learners those who participated in the research benefit a lot such as learning a topic in depth, thinking like a scientists and gaining variable skills.

CONCLUSION

Thus cognitive constructivism strategy which is associated with

information processing helps the learners to construct their knowledge and teacher acts as a facilitator in this process. Both the basic and integrated science process skills are to be developed among the learners in order to promote scientific temperament, attitude towards science and to place them in the position of scientists. Cognitive constructivism based strategy provides suitable environment to the learners to carry out various activities and experiments both in laboratory and in classroom to construct their knowledge which automatically enhance various science process skills. Hence the science teacher who adapts this strategy excels in teaching of science and in turn the learners excel in learning of science.

REFERENCES

1. Yamtinah Sri; Masykuri Mohammad; Ashadi; (2017) Gender Differences in Students' Attitudes toward Science: An Analysis of Students' Science Process Skill Using Test let Instrument AIP Conference Proceedings 1868, 030003 (2017); https: //doi.org /10.1063/1.4995102
2. Conner, Lindsey Norma (2014) Students' Use of Evaluative Constructivism: Comparative Degrees of Intentional Learning International Journal of Qualitative Studies in Education (QSE), v27 n4 p472-489 .
3. Mayer-Smith and Mitchell (1997) Teaching about constructivism: Using approaches informed by constructivism. In V. Richardson (Ed.), Constructivist teacher education (p. 135-152). Washington, DC: Falmer Press.
4. Qiong Jia (2010) A Brief Study on the Implication of Constructivism Teaching Theory, International Education Studies, Vol. 3, No. 2; May 2010.
5. Shumaila Bhutto, Imran Umer Chhapra (2013) Educational Research on "Constructivism"- An Exploratory View, International Journal of Scientific and Research Publications, Volume 3, Issue 12, December 2013 7 ISSN 2250-3153.
6. Arredondo, D., & Block, J. (1990). Recognizing the connections between thinking skills and mastery learning. Educational Leadership, 47(5), 4-10.
7. Smith, W. (1989). Toward mastery of thinking skills in East Islip. Educational Leadership, 47(5), 6.