Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 12, pp.62932-62934, December, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

IMPACT OF PROBLEM BASED LEARNING ON TEACHING BIOLOGY FOR HIGHER SECONDARY STUDENTS

***Dr. B. Ranjanie**

Department of Education, Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India

ARTICLE INFO

Article History:
Received 18th September, 2017
Received in revised form
27th October, 2017
Accepted 19th November, 2017
Published online 27th December, 2017

Key words:
Problem Based Learning,
Achievement,
Cognitive domain,
Higher order thinking skills,
Module.

ABSTRACT

The aim of the study was to determine the impact of problem based learning strategy to teach biology for eleventh standard students to enhance the higher order thinking skills. In the present study quantitative data were obtained by adopting quasi single group experimental design via pretest/post test method. The research study was conducted on 106 eleventh standard students studying in Ambattur, Chennai during the year 2013-2014 in three different types of schools namely government school (n=34), government aided school (n=41) and private school (n=31) through the purposive cluster sampling technique. The treatment includes three months, 60 hours in each school to test the strategy excluding pretest, post test and retention test. In the research the measurement used was achievement test. It was constructed based on the cognitive domain of bloom's taxonomy of behavioral objectives. The Cronbach reliability coefficient of the achievement test was 0.77. Printed module was prepared by the researcher and distributed to the students about the subject matter which was taught in the problem based learning method which includes open-ended questions, problem scenarios, ill structured problems, case studies and self activities, worksheets were dealt for all the eleventh standard students (n=106) studying in different types of schools. Initially Pretest was administered to find the entry level behavior of the students followed which treatment was given for a period of three months, 60 hours in each school and post test was conducted to test the effect of Problem based learning strategy among the students. Delayed post test was conducted after the interval of sixty days to find out the retention level of students. Results revealed that students have acquired higher order thinking skills by adopting the problem based learning strategy and significant difference was found in the post test and retention test at 0.05% level of significance at the analysis and synthesis levels of cognitive domains in the achievement test.

Citation: Dr. B. Ranjanie, 2017. "Impact of problem based learning on teaching biology for higher secondary students", *International Journal of Current Research*, 9, (12), 62932-62934.

INTRODUCTION

Critical-thinking curriculum is relatively more difficult to implement in Asian classrooms because the teachers and students are more accustomed to the passive, transmissive, and knowledge-based model of learning; thus, more clear practice guidelines and more transitional time are needed for Asian learners to practice and acquire this essential skill (Vandermensbrugghe, 2004). Problem-based learning (PBL) is an innovative curricular approach that was originally developed in medical school programs (Barrows and Tamblyn, 1980), and later adapted for use in elementary and high school settings. Today, many science educators considering this connection have increasingly started to apply problem-based learning approach in science education (Lazear, 1991; Treagust and Peterson, 1998; Gallegher *et al*., 1999; Slavin, 1999; Greenwald, 2000; Yuzhi, 2003; Senocak, 2005; Wilson, 2005; Kilie, 2006). Problem based learning can be seen as a combination of cognitive and social constructivist theories. In Piaget's (1970) theory of cognitive development, PBL focuses on cognitive reorganization, uses primary data or other interactive materials, emphasizes autonomy, relates to personal experiences, organizes information around problems, concepts and questions, builds on prior knowledge, addresses misconceptions and promotes question-asking behavior. On the other hand, in Vygotsky's (1978) theory of social constructivism, PBL encourages learners to solve authentic problems which reflect real-world complexities, gives choices to learners for multiple solutions, shares common interests, uses activities with uncertainty and novelty, encourages learners elaborate and justify their answers, encourages group processing of experiences and fosters multiple ways of understanding a problem. Piaget's theory of constructivism puts emphasis on how learning occurs, rather than focuses on what influences learning. Here, the teacher plays a significant role by assisting their students in gaining their own understanding. Instead of being told the answers, students should own the

Corresponding author:* **Dr. B. Ranjanie,
Department of Education, Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India.

learning process and come to their own conclusion. During the learning progress, the teacher continually communicates with their students and creates learning experiences matching their needs.

Objectives

- To measure the effect of problem based learning on the achievement of learning biology among the eleventh standard students.
- To develop a printed Module and find the effectiveness of Problem Based Learning strategy for teaching biology to the X1th Standard students to increase the higher order thinking skills.

Hypothesis

- Eleventh standard students taught through problem based learning will show a statistically significant difference between the pre, post and retention test of achievement in learning biology after its implementation.

MATERIALS AND METHODS

Quasi single group experimental design without control group was adopted for the study in order to involve all the students in the study. As an intervention Problem Based Learning Strategy was implemented to the students. The presentation was made to the students about what is PBL and how the PBL classroom proceeds. The printed module in the form of a hand book about PBL was prepared by the researcher and it was distributed to the students to guide them during the implementation. The research study was conducted on 106 eleventh standard students studying in Ambattur, Chennai during the year 2013-2014 in three different types of schools namely government school (n=34), government aided school (n=41) and private school (n=31) through the purposive cluster sampling technique. The treatment includes three months, 60 hours in each school to test the strategy excluding pretest, post test and retention test. In the research the measurement used was achievement test. It was constructed based on the cognitive domain of bloom's taxonomy of behavioral objectives. The Cronbach reliability coefficient of the achievement test was 0.77.

The subject matter was taught in the problem based learning method which includes open-ended questions, problem scenarios, ill structured problems, case studies were dealt for all the eleventh standard students (n=106) studying in different types of schools. Initially Pretest was administered to find the entry level behavior of the students followed which treatment was given for a period of three months, in each school and post test was conducted to test the effect of Problem based learning strategy among the students. Delayed post test was conducted after the interval of thirty days to find out the retention level of students.

RESULTS AND DISCUSSION

Results of the Paired sample t test to compare the mean score between the pretest, post test and retention test of the achievement in learning biology. It is inferred that the value of 'p' is less than 0.01 in the dimensions of application, analysis, and overall achievement test of cognitive domains whereas the dimensions of knowledge, comprehension and synthesis level of cognitive domains are greater than 0.05 and found to be significant at 5% level in the achievement test. Hence it is concluded that there is a significant difference found between the pretest, post test and retention test of eleventh standard students in their achievement test after the implementation of problem based learning and hence the hypothesis is accepted.

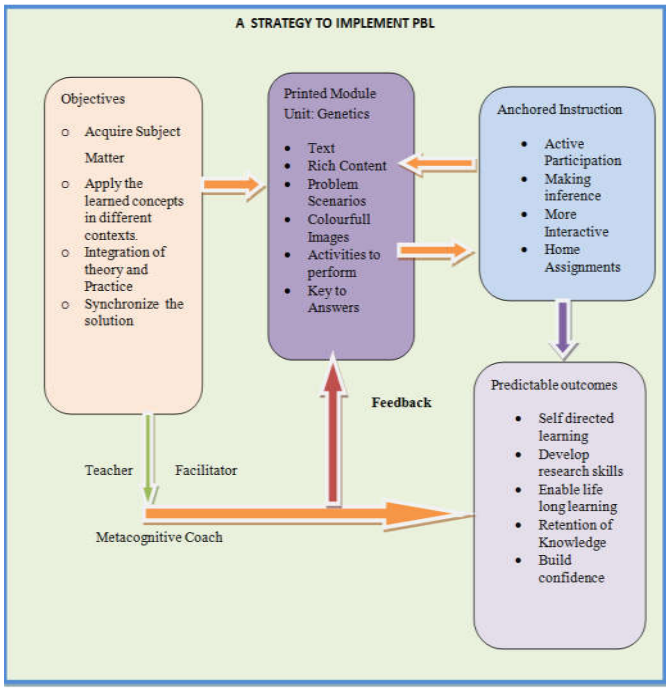

Fig.1. Strategy to implement problem based learning

Cognitive domains	Pre Test		Post Test		Retention Test		"t"	"P"
	Mean	SD	Mean	SD	Mean	SD		
Knowledge	4.14	1.924	7.51	1.68	7.90	1.338	2.565	0.012*
Comprehension	3.23	1.462	7.02	1.55	7.32	1.418	2.165	0.033*
Application	3.08	1.755	6.42	2.11	7.15	1.695	5.047	0.001**
Analysis	1.74	1.098	4.08	1.05	4.61	1.092	5.257	0.001**
Synthesis	0.38	0.543	2.75	0.83	2.96	0.883	2.369	0.020*
Over all achievement test	12.56	3.899	27.78	4.39	29.94	3.548	6.069	0.001**

** - denotes significance at 0.01 % level. * -denotes significance at 0.05% level

Result reveals that the retention test score in the domains of the achievement test is found to be higher when compared to the post test and pretest score. The result indicated a significant effect of the treatment on students' achievement in learning biology. This became evident with the outcome of post-test in the experimental class after the intervention. Students were engaged in the new innovative teaching group by using the problem based learning strategy, which gave room for learners to participate actively in class and appreciate the new idea. The

present study correlates with the findings of Hung (2013) PBL enhances student's learning outcomes by promoting their abilities and skills in applying knowledge, solving problems, practicing higher order thinking and self directed learning and reflecting on their own learning.

Conclusion

Research in this area is important as school student's achievement is instrumental in shaping their educational and career pathways. The present study aimed to measure the effect of problem based learning on the achievement of biology of eleventh standard students. The results of the present study revealed that Problem based learning contributed significantly towards the achievement of learning biology among the eleventh standard students. In problem based learning students tend to acquire the scientific conceptions, integrate and organize knowledge, (Gulsam Araz and Semra Sungar, 2007). Following the treatment, significant differences were found in the post test scores and retention test scores in all the levels of cognitive domains. Psychological research and theory suggest that students learning through the experience of solving problems can learn both content and thinking strategies (Patrick Lai, 2000). PBL is a teaching and learning innovation which fosters creative and independent learning. The present study addressed the critical link between the content knowledge and skills especially in enhancing the higher order thinking skills. The PBL is an instructional and learner centered approach which empowers the learners to conduct research, integrate theory and practice to apply the acquired knowledge and skills to develop a viable solution to a defined problem. The result reveals that PBL provide fertile environment for learning.

REFERENCES

Araz.G. and Sungur.S. 2007. Problem-based Learning, Effectiveness of Problem-based Learning on Academic performance in Genetics, *Biochemistry and Molecular Biology Education,* Vol.35, No.6, Pp.448-451, 2007.

Barrrows, H. S. and Tamblyn, R. M. 1980. *Problem-based learning: An approach to medical education*. New York: Springer.

Gallagher, S. A. and Gallagher, J. J. 2013. Using Problem-based Learning to Explore Unseen Academic Potential. *Interdisciplinary Journal of Problem-based Learning, 7*(1).

Hung, W. 2013. Problem-based learning: A learning environment for enhancing learning transfer. *New Directions for Adult and Continuing Education,* 137, 27-38.

Vandermensbrugghe, J. 2004. "The unbearable vagueness of critical thinking in the context of Anglo-Saxonisation of education". *International Education Journal*, 5(3). Pp 417–422.

Vygotsky, L. S. 1978. Mind in society: The development of higher psychological Processes. Cambridge, MA: Harvard University Press.

****