



RESEARCH ARTICLE

METACOGNITIVE AWARENESS AND ACADEMIC ACHIEVEMENT IN GENETICS THROUGH PROBLEM BASED LEARNING

*Ranjanie, B. and Rajeswari, V.

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

ARTICLE INFO

Article History:

Received 29th October, 2015
Received in revised form
22nd November, 2015
Accepted 17th December, 2015
Published online 31st January, 2016

Key words:

Metacognitive awareness Inventory (MAI),
Problem Based Learning (PBL).

ABSTRACT

The study aims to determine the metacognitive awareness and academic achievement in genetics among the eleventh standard students through the Problem Based Learning (PBL) approach. The Sample for the study (n=106) were selected in three schools in Chennai through purposive cluster sampling technique. Single group pre-post test comparison design was used to collect the data using the Metacognitive awareness Inventory (MAI) and achievement test in genetics constructed by the researcher. Appropriate statistical analysis of the collected data reveal that PBL was more effective in developing metacognitive awareness among the students and enhanced the students to reveal their academic potential in learning genetics.

Copyright © 2016 Ranjanie and Rajeswari. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Ranjanie, B. and Rajeswari, V. 2016. "Metacognitive awareness and academic achievement in genetics through problem based learning", *International Journal of Current Research*, 8, (01), 25883-25884.

INTRODUCTION

Problem Based Learning is a teaching strategy that reflects a new way of thinking about teaching and learning. PBL classroom is meant to engage the student as an active participant in the learning process. It is an educational approach in which complex problems serve as a context and the stimulus for learning. The students deal the ill structured problems and find the possible solutions. The problem promotes a range of activities that allow the students of different levels to contribute to the solution. David Gijibels and Filipdochy (1999) suggest that Problem Based approach to learning have a long history of advocating experience based education. Hallininger (2005) found that PBL helps the students to apply domain specific knowledge to the solution of the problems which are likely to be encountered in their future carriers. Hmelo Silver (2004) suggest that effective use of PBL methods prepare the students to be flexible thinkers who can work productively with others to solve problems. Rotbain Marbach –Ad and Stavay (2006) demonstrated that genetics is one of the most important yet difficult topics to teach and learn

in school science. PBL is the leading method that provides the individuals the self directed learning and lifelong learning skills, developing their metacognitive skills to find the solutions to the problems they face in their daily life, Yurdakul (2004).

MATERIALS AND METHODS

Single group pre-post test design was adopted to carry out the study. The Sample comprises of 106 students studying in eleventh standard from three different schools were selected by Purposive cluster sampling technique. Metacognitive awareness inventory (MAI) developed by Schraw and Dennison (1994) was used to find out the metacognitive awareness level of students. The inventory comprises of 52 items with yes or no response for which 'yes' carries 1mark and 'No' carries zero. Achievement test in genetics was constructed by the researcher on a predefined blue print including all the levels of cognitive domain related to genetics concept was used for the administration of pre, post and retention test. The test items with multiple choice responses was taken from the concept of multiple alleles, quantitative inheritance, sex determination, sex linked inheritance and pleiotropy.

*Corresponding author: Ranjanie, B.,

Department of Education, Mother Teresa Women's University,
Kodaikanal, TamilNadu, India.

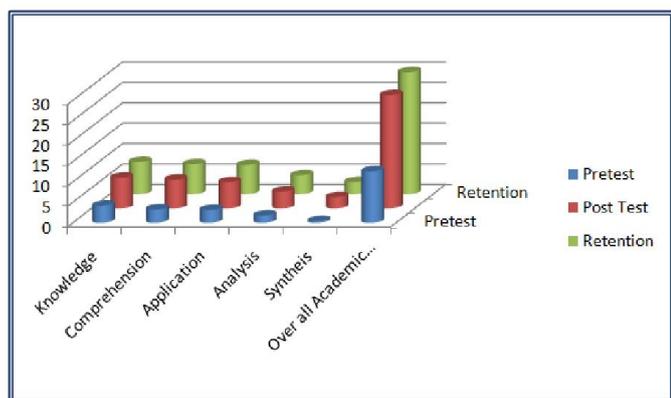


Figure 1. Pair wise Comparison between Pre, Post and Retention test

Printed module on genetics under the state board school curriculum was prepared in the form of hand book and distributed to the students. Before intervention Pre test was administered to the students to find the entry level behavior of the students. The module contains the text, images, Problem scenarios, self activities, home assignments and key to answers. The students were divided into 5 groups consisting of five members in each group. Problem scenarios were given to each group for discussion and interaction among the group members. As they precede the module they have to complete the self activity given in the worksheets, since it plays a vital role in identifying the problem, searching the information, analysing and synthesizing the information. Intervention was given for a period of four weeks for 20 hours in each school for each group. After completion of the intervention the post test was administered and the retention test was also conducted after a period of sixty days to find out the retention of learning among the students.

RESULTS AND DISCUSSION

Results reveal that PBL has significant impact upon the eleventh standard student's academic achievement in genetics. Research suggests that the students learn the best in the context of a compelling problem (Ewell, 1997) through their learning experiences. Students learn through cognitive connections, social connections and experiential connections. This new understanding has given rise to the notion of paradigm shift in higher education.

The post test score reveal that significant difference was found at 1% level in all the cognitive domains when compared to their pre test score, whereas in the retention test significant difference was found at 5% level in all the cognitive domains of knowledge, comprehension, application, analysis and synthesis. Hence it indicates that PBL strategy enhanced the students to solve the ill structured problems in finding various solutions to the problems. Findings reveal that application of PBL has a significant influence among the eleventh standard students to acquire scientific conception related to genetics. Hence, Genetics is the multidisciplinary subject that integrates biology, mathematics, social studies and health which enables the students to understand how concepts in science apply to many facets of life.

REFERENCES

- Akinoglu.O. and Tandogan. R.O., 2006. The Effects of Problem-Based Active Learning in Science Education on Students' Academic Achievement, Attitude and Concept Learning, *Eurasia Journal of Mathematics, Science & Technology Education*, 2007, 3(1),71-81.
- 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.
- Aurah., Muhanja.C., 2013. The influence of self-efficacy beliefs and Metacognitive prompting on genetics problem solving ability among high school students in Kenya, Doctoral Dissertations, Department of Biology.
- Chin, C and Chia, L.G., 2005. Problem-based learning: Using Ill structured Problems in biology project work, Wiley periodicals, Inc.,
- Gallagher, S.A., Stephien, W.J., Sher, B.T. and Workman, D. 1999. Implementing Problem Based Learning in Science Classrooms. *School Science and Mathematics*. 95(3), 136-146
- Peter Snustad., and Michael J., Simmons, 2012. Genetics, Sixth edition, International student version, John Wiley and sons, Inc.,
- Tosun, C., and Senocak, E., 2013. The Effects of Problem-Based Learning on Metacognitive Awareness and Attitudes toward Chemistry of Prospective Teachers with Different Academic Backgrounds, *Australian Journal of Teacher Education*.
