

# An Effectiveness of Web 2.0 Technology - based Cognitive Approaches in Life Sciences Learning among Secondary School Students

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**Abstract:** *Cognitive Approach has proved to play a vital role in the learning formation areas. The current curriculum of NEP - 2020 has strongly recommended that cognitive science strategies are very essential in our pedagogical system. According to Reed Hunt and R & Ellis H. C (2007) concepts, cognitive science is a mental process activity and involves problem - solving approaches, which stimulate the student's higher level thinking power. Now, in the present era, computer maximizes the effectiveness of learning in all fields. Various private organizations in the 'America like community colleges have certified these approaches for effectiveness of learning. With computer, the cognitive approaches have raised the maximum learning in the biological science It has been proved by experimental research. Sixty students were taken randomly from Govt. Aided Higher Secondary School for this experiment. The investigator, without any bias, selected and divided the students into two groups. One group was taught with traditional lecture method and another group was taught with the CACA method. After conducting the experiment, the post - test results were analyzed with statistical procedures. The CACA highly deviated from the normal method. Hence, the cognitive approach has higher effectiveness for biology learning.*

## 1. Introduction

Cognitive Psychology has become the basis for numerous approaches to learning (Driscoll., M.2000, Roediger, H.2000, Hunt, E. B.2002, Wells, G & Claxton, G.2002). Fundamentally, there are four approaches in cognitive learning like social cognitive, cognitive information - processing, cognitive constructivism and social constructivism. In social cognitive psychology, how behavior, environment and cognitive factors interact to influence the learning has to be verified. In cognitive - information processing, how children process the information through attention, memory, thinking and other cognitive processes are analyzed (Bhatia. H. R.1973, Woolfolk, A. E.1980, Mengel, S. K.1998, 2000, Kundu, C. L. & Tutoo, D. N.1998, Chauhan, S. S.2003, Bhatnagar, A. B., Meenakshi, B. & Anuray, B.2004, Aggarwal, J. C.2005, Morgan, CT.2006)

### Need and Significance of the Study

Cognitive constructivism has strongly recommended a child's cognitive construction of knowledge and understanding. In social constructivism it emphasizes collaboration with others to produce knowledge and understanding.

All approaches contribute to our understanding of how humans learn. Bandura's social cognitive factors might involve the human expectations for human success and also social factors involve observing the environment for human success. Further he said that when humans learn, they can cognitively represent or transform their experience through mental processes (Bandura. A.2001). Here, cognitive factors are called as self - efficacy.

In Siegler's view, thinking is an information - processing model. He said that when children perceive the information and encode, it represents and stores information from the environment. and they are engaging in thinking. And also, certain other co - factors like change mechanisms and self - modification are involved (Siegler. B. S.1998). Pressley and his colleagues have developed a meta cognition model called the Good Information - Processing concept. Here, competent cognition results from a number of interacting factors (Pressley. M.1983, Chauhan, S. S.1979, Kumar, K. L.1996).

Famous scientist Piaget's says in the cognitive constructivist approach as students construct knowledge by transforming, organizing, and reorganizing previous knowledge and information processes they are involved in the process of learning. Whereas, Vygotsky emphasized that student's construct knowledge through social interactions with others. Here, Situated Cognition is an important assumption in the social constructivist approaches. In this theory, the thinking is located in social context, not within an individual's mind. (Gauvain, 2001). Hence, cognitive science provides more learning through perception. thinking, attention and problem - solving whereas other approaches like knowledge transmission learning that have been in practice failed to develop perception, problem - solving ability and other processes. The present research is undertaken to compare the effectiveness of Computer - Assisted Cognitive Approaches (CACA) over traditional lecture method in Biology learning.

### Objectives of the Study:

- To develop a computer software package in Biology for IX Standard students
- To compare the effectiveness of CACA over traditional lecture method in Biology learning.

**Hypothesis of the Study:**

There is no significant difference between the effectiveness of CACA and traditional lecture method.

**2. Methodology**

Sixty students were selected by random sampling procedure. Each of the thirty students was grouped in experimental and control groups. Beginning behaviors were analyzed by pre - test. Contents of subject was selected from Higher Secondary Syllabus of Biology of IX standard (State Board).

The investigator developed a computer software package with educational technology principle and screened through Personal Computer. The following content were analyzed from Biology chapter.

- Introduction to Biology
- Structure Cell
- History of Cell
- Specific Characters of Cell
- Molecular Biology of Cell
- Roles of Suppressor Gene
- Control Measures - Tissue Biopsy
- Stage Identification - Medicines.

Around 80% of average achievements were recorded by pilot study procedures (test conducted for sixty students with three times and equal duration) and criterion levels were recognized. The same objectives were framed for control groups with same duration. Students' achievement scores were measured by a standardized tool. Spearman Brown Prophecy formula was adopted to measure the reliability. The reliability of the whole test was found to be 0.88 (correlation coefficient value is 0.79)

**3. Results**

Statistical analysis of pretest and posttest scores from experimental and control groups are furnished on Table 1. The scores of Mean value of pre - test and post - test from CACA were found to be higher than the traditional lecture method.

**Table 1:** Scores of Pre - test and Post - test of Experimental Group and Control Group

S. No.	Statistical Analysis	Experimental Groups		Control Groups	
1.	Mean	10.13	24.46	09.20	17.53
2.	SD	4.910	12.27	2.883	5.005

As seen from Table 1 the scores of Standard Deviation (SD) value of pretest and posttest from CACA were found to be higher than traditional lecture method. Therefore the null hypothesis is rejected.

**Table 2:** Details of t - scores from experimental and control Groups

Groups	N	Mean	SD	t - ratio
Experimental Groups	30	24.46	12.27	2.86*
Control Groups	30	17.53	5.005	

As seen from Table 2 the value of sigma score is 2.86 and value of critical ratio 2.58 at 1% level. Hence, the difference

is significant. The data of t - score from experimental and control groups are furnished in this table.

**4. Conclusions and Recommendations**

Cognitive approach gives more importance to perceptual processes. This perceptual learning is of complex nature and takes place generally in three ways. The first steps in cognitive structure have dynamic differentiations. It provides encoding process in learning. The second step is generalization. Here, concept is differentiated to form single unifying ideas. The final process is re - structurisation. The ideas are accommodated to the present environment. It means, the ideas are stored in permanent memory.

Previously, cognitivists believed in insight learning. According to Descartes, Kant, the ability to perceive the way we do is learning. But Berkeley and Locke emphasized that we learn our ways of perceiving through experience with objects in the world about us. Here, both concepts strongly recommended sensory experience and doing concept.

But modern cognitive psychologists strongly emphasize human - mental processes (Santrock, J. W.2006, Valvatne, L.1985). In recent years, the concept of perceptual learning is feature analysis or bottom - up processing model. Here, the meaning is a capital letter 'A' which consists of two relatively straightlines joined at a 45 - degree angle and a horizontal line through the middle. Whenever we see these features, we recognize an A.

But, in knowledge and cognitive view, knowledge creates our perceptions, focuses our attention and is the stuff of our memories (Glover, Ronning, R. R., Bruning, R. H.1990). It makes several distinctions about kinds of knowledge through perceptual learning. Our senses are bombarded - with sights and sounds every second. Here every variation in color, movement, sound, smell, tempe - rature has to be perceived from the environment.

Flavell. J. H, (1985), has described four aspects of attention for learning. - These are controlling attention, fitting attention to the task, planning and monitoring attention. In another view, a problem is 'a situation in which we are trying to reach some goal and must find a means forgetting - there' (Chi & Glaser, 1985). This is problem - solving approach for learning.

In another research, cognitive \_ science and the use of information and communication technology are related fields that have supported the \_ constructivism learning (Dogra, B.2010, Gupta, It. & Tyagi, S.2014).

As stated above, all the information makes sure to form the learning process rather than other concepts of learning. From this - research interpretation, the experimental group got higher statistical value than control group. - Students of adolescence accepted CACA method for their learning. Hence, the investigator has highly recommended the cognitive types of approaches for maximizing learning.

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