EFFECT OF CONCEPT MAPPING ON ACHIEVEMENT OF TRAINEE TEACHERS OF B.ED. COURSE

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Rajshree S. Vaishnav
Associate Professor
P.G. Department of Education
Chirayu K. C Bajaj College of Education
Nagpur (M.S.) India

Abstract

The purpose of this research study was to determine the effects of concept mapping on the achievement of trainee teachers of B.Ed. course for Educational Psychology subject. The study was conducted with one hundred twenty (120) trainee teachers of B.Ed. course enrolled at Chirayu K.C. Bajaj College of Education, Nagpur city, Maharashtra state, India. The trainee teachers of B.Ed. course were divided in to two groups randomly as experimental and control group. Both the group was tested with self-prepared criterion reference test as pre- tests containing 20 multiple-choice questions and standardized problem solving ability test of Garg R. After the pretest, the control group was taught through traditional method of teaching and the experimental group was taught through concept mapping technique along with regular teaching. After completion of the unit, the students on both groups were given the same criterion reference test and problem solving ability test as posttest. Test scores were analyzed for any statistically significant difference in the scores on the test. The results from the present study indicate that concept mapping has a positive impact on B.Ed. trainee teachers' achievement in Educational Psychology subject and improved problem solving ability score.

Keywords : *Concept mapping, trainee teachers of B.Ed. Course, Criterion reference test, problem solving ability, Educational Psychology*

Introduction : Concept maps are graphical tools for organizing and representing knowledge. They include concepts, usually enclosed in circles or boxes of some type, and relationships between concepts indicated by a connecting line linking two concepts. Words on the line referred to as linking words or linking phrases, specify the relationship between the two concepts.

Joseph D. Novak of Cornell University is considered to be the one who, in the 1960s, started the systematic use of concept mapping for learning (Novak, 1993). It was developed in 1972 in the course of Novak's research program at Cornell where he sought to follow and understand changes in children's knowledge of science (Novak & Musonda, 1991). This program was based on the learning psychology of David Ausubel (1963; 1968; Ausubel *et al.*, 1978). The fundamental idea in Ausubel's cognitive psychology is that learning takes place by the assimilation of new concepts into existing concept and propositional frameworks held by the learner. This knowledge structure as held by a learner is also referred to as the individual's cognitive structure. Out of the necessity to find a better way to represent children's conceptual understanding emerged the idea of representing children's knowledge in the form of a concept map. Thus was born a new tool not only for use in research, but also for many other uses in educational setting.

Psychological Foundations of Concept Maps : If we go through our Psychological foundation of learning we come to know that the first concept is acquired by children during the ages of birth to three years, when they recognize regularities in the world around them and begin to identify language labels or symbols for these regularities (Macnamara, 1982). This early learning of concepts is primarily a discovery learning process, where the individual discovers patterns or regularities in events or objects and recognizes these as the same regularities labeled by older persons with words or symbols. This is a phenomenal ability that is part of the evolutionary heritage of all normal human beings. After age 3, new concept and propositional learning is mediated heavily by language, and takes place primarily by a reception learning process where new meanings are obtained by asking questions and getting clarification of relationships between old concepts and new concepts. This acquisition is mediated in a very important way when concrete experiences or props are available; hence "hands-on" activity is important for learning with young children, but this is also true with learners of any age and in any subject matter domain.

In addition to the distinction between the discovery learning process, where the attributes of concepts are identified autonomously by the learner, and the reception learning process, where attributes of concepts are described using language and transmitted to the learner, Ausubel made the very important distinction between *rote* learning and meaningful learning. Meaningful learning requires three conditions:

1. The material to be learned must be conceptually clear and presented with language and examples relatable to the learner's prior knowledge. Concept maps can be helpful to meet this condition, both by identifying large general concepts held by the learner prior to instruction on more specific concepts, and by assisting in the sequencing of learning tasks though progressively more explicit knowledge that can be anchored into developing conceptual frameworks.

2. The learner must possess relevant prior knowledge. This condition can be met after age 3 for virtually any domain of subject matter, but it is necessary to be careful and explicit in building concept frameworks if one hopes to present detailed specific knowledge in any field in subsequent lessons. therefore, the 2 prior conditions i.e. material to be learned must be conceptually clear and presented with language and the learner must possess relevant prior knowledge are interrelated and both are important.
3. The learner must choose to learn meaningfully. The one condition over which the teacher or mentor has only indirect control is the motivation of students to choose to learn by attempting to incorporate new meanings into their prior knowledge, rather than simply memorizing concept definitions or propositional statements or computational procedures. The indirect control over this choice is primarily in instructional strategies used and the evaluation strategies used. Instructional strategies that emphasize relating new knowledge to the learner's existing knowledge foster meaningful learning. Evaluation strategies that encourage learners to relate ideas they possess with new ideas also encourage meaningful learning.

Creativity can be seen as a very high level of meaningful learning. People often confuse rote learning and meaningful learning with teaching approaches that can vary on a continuum from direct presentation of information (which may be conceptually obscure or conceptually explicit) to autonomous discovery approaches where the learner perceives the regularities and constructs her/his own concepts. Both direct presentation and discovery teaching methods can lead to highly rote or highly meaningful learning by the learner, depending on the disposition of the learner and the organization of the instructional materials.

A meta analysis of research studies conducted in the field of concept mapping indicated that this teaching learning method prepare learners to think critically. It fosters a long term change in thinking and contributes to changing young as well as adult learners learning strategies.

In subjects like Science social studies, mathematics, English, Spanish etc, concept mapping has been widely recommended and used in a variety of ways. It has been used to help teachers and learners to build an organized knowledge base in a given discipline (pankratius,1990) or on a given topic (Kopec ,Wood and Brody,1990) it has been used to facilitate middle level students'(sixth, seventh, eighth grade) learning of science concept(Guastello et al, 2000, Hawk ,1986;Ritchi and Volkl,2000;Sunger et all,2001;Duru and Gurdle,2002) finding from these studies indicate that concept mapping is an effective tool for aiding students comprehension and retention of material. Students using concept maps scored higher than students receiving more traditional types of instruction.

Studies conducted in the area of social studies by (Alvermann and Boothby, 1983; Alvermann and Boothby,1986; Armbuster et al ,1991;Griffin et al ,1995 used concept mapping to help students organize information from expository texts and comprehend content area reading. Finding from these studies concluded that concept mapping tool helped student select, organize, and recall relevant information, as measure by post test. They were also able to transfer thinking and learning skills to novel situations and content. According to study conducted by (Braselton and Decker, 1994) Concept mapping is also helpful in development of problem solving skills in mathematics of sixth grade learners.

Another studies conducted by (Nirmala T and Shakuntala, 2011) found that concept mapping is also advantageous in promoting critical thinking skill among nurses where as other study conducted by (DeWispelaere and Kossack, 1996) in a junior and high school students Spanish as a second language class found that concept mapping tool improved students higher order thinking skills as measured by performance on chapter quizzes, tests and student projects.

The above referred research increasingly support the idea that the use of concept mapping tool can extend and enrich students learning, higher order thinking, problem solving ability in various subjects and levels from primary to senior level in important and unique ways. In changing global scenario and rapid advancement of knowledge sector life long learning with high academic performance is indispensable from the part of learner, in which teacher can play crucial role. In the world of education concepts are inter -related and built on each other therefore Concept mapping would be very useful in teacher education class room as learning tool.

In the present study an attempt has been made to see the effect of concept mapping tool on achievement of B.Ed. Trainee teachers for subject educational psychology. Educational Psychology is one of the important subjects in teacher training program. Understanding child behavior and his/her development of learning process is very important for success of teaching learning process. Hence this research study aimed to investigate the effects of incorporating concept mapping on achievement, and problem solving ability of B.Ed. trainee teachers for Educational Psychology subject. It is expected that findings of this research will encourage teachers and teacher educators to incorporate concept maps in to their teaching

Hypothesis : It is hypothesized that there will be no significant difference between B.Ed. trainee teachers who are exposed to concept mapping by using computerized concept mapping program in addition to regular teaching practices as apposed to who are not exposed to concept mapping tool for teaching Educational Psychology subject with respect to achievement and problem solving ability.

Methodology : The purpose of this research study was to determine the effect of using computerized concept mapping program on achievement of B.Ed. trainee teachers in

Educational Psychology subject and problem solving ability. A pre test- post test control group design was used. The independent variable was incorporation of computerized concept mapping program into the instruction. The dependent variable of the experiment was the level of students' achievement on post test that was determined by self constructed criterion reference test and problem solving ability score on post test determined by problem solving ability test by Garg R.

Sample : Participants in this study were 120 B.Ed trainee teachers enrolled in Educational Psychology classes during 2011 at Chirayu K.C. Bajaj College of education in Nagpur, India. The 60 students selected randomly as control group i.e. not exposed to computerized concept mapping program where as another 60 students assigned to experimental group exposed to computerized concept mapping program in addition to regular teaching practices.

Tools of the study : Following tools were used for the study

1 Self prepared criterion test comprising of 20 multiple choice question on topic "learning and learning theories' of subject educational Psychology was used as pre and post test to see the effectiveness of computerized concept mapping program in terms of achievement of learner for educational Psychology subject.
2 Problem Solving ability test prepared by Garg R. was used to study the effect of computerized concept mapping program on problem solving ability of learner.

Procedure : This study was conducted over a period of 30 days. During classes they meet for 60 minutes each day a total of 5 days per week. A total of 120 students enrolled for Educational Psychology subject of B.Ed. teacher training program were divided randomly as Experimental and Control group. Both the group was given self prepared criterion test and problem solving ability test as pre test.

The experimental group was taught using computerized concept mapping program along with regular teaching on unit "learning and learning theories". During the course of instruction students were asked to prepare their own concept maps using paper pencil individually and discuss with group of 3 to 4 students and prepare a collaborative concept map on the content covered during the teaching period. Where as the same content was taught to the control group through regular teaching i.e. without exposing to concept mapping program by the same instructor. All the activities and material were the same for each group except concept mapping program for experimental group. After completion of course on unit "learning and learning theories" both the group were administered the same criterion reference test and problem solving ability test as post test.

Findings : As from table 1 pre and post test score of experimental group students indicates that there is a significant statistical difference between the performances of the students of experimental group. The t score of 81.69 is significant at .01 level.

Table 1.0
Pre and Post criterion test result of experimental group

Test	No. of students N	Mean	S.D	R	t value
Pre test	60	4.10	1.07		
Post test	60	19.12	0.94	.18	81.69*

*Significant at .01 level of significance

Table 2.0
Post criterion test result of experimental and control group

Group	No. of students N	Mean	S.D	R	t value
Control group	60	15.78	.92		
Experimental group	60	19.12	1.68	.06	13.69*

*Significant at .01 level of significance

Post test score of both the group students indicates that there is a significant statistical difference between the performances of the students of experimental and control group on criterion reference test. The t score of 13.69 is significant at .01 level . this shows that experimental group performed better in terms of achievement than control group.

Table 3.0
Pre and Post problem solving ability test result of experimental group

Test	No. of students N	Mean	S.D	R	t value
Pre test	60	4.20	.92		
Post test	60	19.08	0.99	.33	84.99*

*Significant at .01 level of significance

As from Table 3 pre and post problem solving ability test score of experimental group students indicates that there is a significant statistical difference between the performances of the students of experimental group. The t score of 84.99 is significant at .01 level.

Table 4.0
Post problem solving ability test result of experimental and control group

Group	No. of students N	Mean	S.D	R	t value
Control group	60	19.03	.99		
Experimental group	60	19.08	1.25	0.07	10.83

*Significant at .01 level of significance

Post test score of both the group students indicates that there is a significant statistical difference between the performances of the students of experimental and control group on problem solving ability test. The t score of 10.83 is significant at .01 level. This shows that experimental group performed better in terms of problem solving ability than control group.

Conclusion : This study provides an additional insight into prior research conducted in concept mapping and its effect on learning. The findings reveal that concept mapping has a positive impact on trainee teacher's achievement and problem solving ability.

It has implications especially for teachers and Teacher educators as teacher training curriculum is being developed mainly on concept acquisition. Using concept mapping tools in teacher training classes will help students to develop better understanding of important concepts it also enhances their problem solving ability.

Using concept maps necessitates that teachers have a good understanding of constructivist learning and the ways in which maps represent students' thinking. This study was conducted with limited number of students further studies may include larger sample sizes in order to determine the most efficient means of using concept mapping tools for maximum benefit and identify the possible effects of gender differences and cultural bias.

Concept mapping requires the learner to make an effort to understand concept meanings, organize concepts hierarchically and form meaningful relationships between concepts to form a coherent, integrated network of the material learned. Engaging the learner in such constructive and transformative cognitive operations during learning enhances memory and recall for the material learned.

According to researches, students better remember information when it's represented and learned both visually and verbally. Concept mapping tools are based on proven visual learning methodologies that help students think, learn and achieve. Visual learning is absorbing information from illustrations, photos, diagrams, graphs, symbols, icons and other visual models. By representing information spatially and with images, students are able to focus in meaning, recognize ideas and group similar ideas easily. The use of concept mapping as a learning tool should therefore be more widely encouraged.

In summary, this study indicates that concept maps can effectively promote learning of students and thus, can be added to the teaching strategies of teacher training. The maps contribute to student success, foster a long-term change in thinking, and contribute to changing students' learning strategies. The maps support both constructivist teaching and learning approaches and may have wider applicability to the world of work as well.

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