Journal of Management and Marketing Review

GATR JOURNALS

Journal homepage: www.gatrenterprise.com/GATRJournals/index.html

J. Mgt. Mkt. Review 2 (1) 33 – 37 (2017)

Concept Formation Teaching Model: An Innovation in Teaching

Aamna Irshad [1]* and Irshad Ullah [2]

[1]Centre for Counseling and Career Advisory, National University of Sciences and Technology, 44000, Islamabad, Pakistan
[2]Education Department, Government of Khyber Pakhtunkhwa, 44000, Islamabad, Pakistan

ABSTRACT

Objective – In the study, a teaching model was devised named as "concept formation teaching model" and its effect on grade IX students' academic achievement was investigated over lecture method.
Methodology/Technique – Experimental group (143 students) and control group (147 students) were chosen for experiment from three Government Girls and Boys High Schools of Rawalpindi. Pretest, posttest Non-equivalent-Groups Design was selected for the study. Pre and post-test were given to experimental and control groups at the start and end of the study. Lessons plans were based on the format of direct instruction. Experimental and control groups were compared by applying t-test and analysis of covariance.
Findings – The results showed that concept formation teaching model was more effective for clarification and strengthening of concepts than lecture method.
Novelty – The study proves that this model is better than lecture method for strengthening Chemistry concepts.
Type of Paper: Empirical

Keywords: Concept; Concept Formation; Teaching; Teaching Chemistry; Concept Formation Teaching Model.
JEL Classification: P46, I21, O31.

1. Introduction

The teacher is the reformer and builder of the nation. The whole education system and quality of instruction are based on teachers. When teachers know how to teach different students and how to form, construct and clarify concepts, the quality of education will increase. Teachers play a significant role not only in strengthening the concepts but also in the overall character building and behavior modification of students. So no one can deny the importance of teachers in the teaching-learning process. Teaching is a multi-dynamic process in which teachers are free to select and use any teaching method, technique, audio-visual aids, models or anything to supplement their teaching. History revealed that many teaching methods and styles have been devised from time to time. The effective teaching method is based on thinking, analytical reasoning, proper understanding and appropriate learning. Question regarding the quality of instruction is always raised by educators and stakeholders of education. They always claim that the teachers are not putting required effort to

* Paper Info: Received: January 25, 2017
Accepted: March 21, 2017
* Corresponding author:
E-mail: aamna.saleem@c3a.nust.edu.pk
Affiliation: Centre for Counseling and Career Advisory, National University of Sciences and Technology, Pakistan

frame clear concepts in students' mind (Khan, 2011). Teachers encourage rote memorization, drill and repetitive learning to get good grades in examination. To remove this strain from teachers, it is required to devise new teaching methods and models to equip students' mind with new and complex concepts.

Govt. of Pakistan (2000) said that being a developing country, quality of instruction can be improved by taking science teaching as the basic aim. Govt. of Pakistan (1998) says that if any country wants to implement reforms at grass root level, it has to give importance to teachers. The teachers play an important role to complete this task. Presently classroom instruction is based on drill, repetition, rote memorization, recall etc. that is the curb of creativity (Chand, 1999). For better understanding and learning, stimulation, motivation, reinforcement, direction and guidance is a compulsory part of teaching. Teacher's responsibility is to facilitate students' learning at the maximum level for their balanced development. The teacher is free to use any method that is suitable to the learning environment. But he/she should be very careful in method selection as the sole aim of teaching is the clarification of concepts. A teaching method is a way to communicate information to students on one hand and to build an organic relationship with students on the other hand (Siddiqui, 1991). So there is a need to devise such methods and models which not only clarify concepts but also make students able to link previous knowledge with new and present one.

2. Concept Formation Teaching Model

This model is based on instructional objectives, previous knowledge, presentation (motivational set and subject-matter), conclusions, generalizations, evaluation and home task. Instructional objectives were based on Bloom's taxonomy to check students' knowledge, comprehension and application (Rashid, 1998). The instructional objectives were translated into behavioral terms. For checking previous knowledge, activity and experiments were conducted, the home task was checked and simple questions from the previous lecture were asked. The presentation was based on motivational set and subject-matter. Motivational set means mental preparedness of students to learn new concepts. Subject-matter means the content taught in the classroom by applying the principles of advance organizers, guided discovery, elaboration, guided practice, inductive reasoning, deductive reasoning and experiential learning. At the end of the lecture, main points were concluded by the students. New formulas, laws, and principles were established in generalization part of the lesson. The whole lesson was recapitulated to check students' progress on instructional objectives. At the end of the lecture, thought to provoke home task was assigned to students. Teachers also explained the way to complete the task at home.

Advance organizer means something to be given in advance of learning to strengthen cognitive structure (Phoenix, 2006). In guided discovery, teachers give some new idea to the students to examine and then guide them to learn details by asking series of questions (Richardson & Reynolds, 2007). Elaboration means an increase of new information or association either in present knowledge or new knowledge (Woolfolk, 1998). In guided practice, students grasp and develop concepts under direct monitoring and supervision of teachers (Combs, 2008). Students reasoned out generalizations, principles, and rules by applying inductive reasoning and apply these rules, principles and conclusions by deductive reasoning (Woolfolk, 1998). Students form and reform concepts again and again and finally make refined concepts by experiences.

3. Methodology

Permission was taken from schools' principals to conduct an experiment in their schools for three months. Principals were informed about the experiment strategy that from two sections of grade IX, random sampling will be done to select one section as an experimental group. The experimental group will be taught through concept formation teaching model and control group will be taught through lecture method. So in this way, 53, 48 and 42 (143) students of three schools took part in the experiment as an experimental group. 55, 50 and 42 (147) students of three schools took part in the experiment as a control group. So, total 290 students studying Chemistry as a subject were included in the experiment.

Pretest-Posttest Nonequivalent Groups Design was chosen due to the nature of the research. The experimental groups and control groups were included in the study. Concept formation teaching model was used to teach experimental groups and lecture method was applied to control groups. Pre-test and post-test were administered before and after teaching in both groups.

An achievement test for grade IX was developed from 7-10 chapters of Chemistry textbook. From each chapter, 25 items were prepared. The achievement test had 100 multiple-choice items with five distracters. The test was validated by the experts of Education and Chemistry subject and was based on the table of the specification to check content validity. A pilot study was conducted prior to the experiment. 30 students from Government Islamia Boys High School No. 2 Rawalpindi were selected for the pilot study. Item analysis was used to improve achievement test. Reliability was checked by Kuder-Richardson formula. The tried-out school was not included in the actual sample. Too simple and too difficult items were deleted from achievement test. Final achievement test had 80 multiple-choice items. Reliability of test was 0.89. In 2002, McVittie (2002) proposed steps of direct instruction that was used for concept formation teaching model's lesson plan. 31 lesson plans were prepared from 7-10 chapters of Chemistry textbook published by Punjab Textbook Board. These lesson plans were finalized after experts' opinion.

4. Data Analysis

To compare the effectiveness of concept formation teaching model over lecture method, *t*-test and analysis of covariance (ANCOVA) was used.

Table 1. *t*-test and analysis of covariance

School	Experimental and Control Group					Pretest-Posttest						F	F value
	df	Pre test	*t*-value	Post test	*t*-value	df	E G	*t*-value	df	C G	*t*-value		
School I	106	-.43	1.98	33.45	1.98	53	-143.38	2.01	54	-6.52	2.01	6.49	3.87
School II	96	-.87	1.99	32.83	1.99	47	-173.21	2.02	49	1.73	2.02		
School III	82	-.36	1.99	33.15	1.99	41	-46.46	2.02	41	-1.24	2.02		

5. Results and Discussion

The study aimed to find out the differences between concept formation teaching model and lecture method on students' learning. The study results showed that experimental group that was exposed to concept formation teaching model scored higher than a control group that was taught by lecture method. Concept formation teaching model was proved to be helpful for students' concepts clarification. Planinic et al., (2008) found that the purpose of teaching is to provoke conceptual change in students so that students move from theoretical knowledge to empirical knowledge. Zaidi and Rahman (2008) said that the most emphasized area of Government of Pakistan is to develop the curriculum on the basis of concept formation rather than the accumulation of unnecessary and unrelated facts.

Several studies (Azizoglu, 2004; Yavuz, 2005; Geban & Onder, 2006) showed that when teachers instruct their students to change their minds conceptually then his approach will work more for remediation of wrong concepts and promotion of understanding of concepts. This study revealed that lecture method is based on declarative knowledge while concept formation teaching model is based on procedural knowledge. By having

the procedural knowledge, the students become able to know the similarities, differences, relationship and inter-relationship among concepts that become fruitful for strengthening the concepts.

Many researchers (Vosniadou, 2007) statistically proved that the initial concepts of students are poor. Due to weak concepts, students have firm believe that they are unable to be successful. This study also concluded that students' prior knowledge about the subject was not up to the mark. So by having such concepts about themselves, they do not put required effort to succeed, ultimately they fail. Hence students' minds are not blank; they have something in their minds. So it is the responsibility of teachers to bring that knowledge into consciousness. Concept formation teaching model is the good way to enhance students' understanding of concepts.

6. Conclusions and Recommendations

Pretest results showed that both experimental and control groups were same on the achievement test. Posttest showed that the concept formation teaching model is helpful for clarification of concepts. Better performance was shown from all schools in posttest that show this model was beneficial for students. Alibali et al., (2001) found that conceptual understanding is strongly related to procedural skills. The relationship improves problem representation and its solution. Yavuz (2005) reported that conceptual change instruction with demonstration and computer assisted concept mapping is the reason of the better accumulation of scientific concepts. Students have a more constructive attitude towards science as a school subject rather than traditional instruction. Geban and Onder (2006) explored that instruction based on conceptual change was much better than conventional teaching style as it brings accuracy in concepts. Pınarba et al., (2009) reported that science process skills of students did a statistically momentous contribution to the variation in understanding of concepts.

The study proves that this model is better than lecture method for strengthening Chemistry concepts. Teachers of Chemistry subject should use this model to improve students' academic achievement. Procedural knowledge should be the focusing area of science teachers. Science teachers should use students' existing knowledge to make them able to solve complex problems and learn difficult concepts. The home task may be given by which teacher evaluates the students' conceptual understanding. If the students have any question or confusion, the teachers should clear it in the beginning of the next day lecture. Research can be done on different science subjects, different grades and different education systems i.e. private and Federal Government schools to examine the effectiveness of concept formation teaching model.

References

Alibali, W. M., Rittle-Johnson, B., & Siegler, S. R. (2001). Developing Conceptual Understanding and Procedural Skill in Mathematics: An Iterative Process. *Journal of Educational Psychology, 93*(2), 346-362.

Azizoglu, N. (2004). *An analysis of undergraduate students' misconceptions related to phase equilibrium in Chemistry* (Doctoral dissertation, The Middle East Technical University). Retrieved from http://66.102.1.104/scholar?hl=en&lr=&q=cache:oguQZrsKTvUJ:etd.lib.metu.edu.tr/upload/12605958/index.pdf+lesson+plan+format+for+concept+formation+in+chemistry

Cimer, A. (2007). *Effective teaching in science: a review of literature*. (Doctoral dissertation, The University of Nottingham). Retrieved from http://66.102.1.104/scholar?hl=env&lr=&q=cache:beyZIE7WWoJ:www.tused.org/internet/tufed/arsiv/v4/i1/metin/tufedv4i1s3.pdf+lesson+plan+format+for+concept+formation+in+chemistry

Chand, T. (1999). *Educational technology.* New Delhi: Anmol Publications.

Combs, H. J. (2008). *Lesson plan design*. Retrieved from http://www.edulink.org/lessonplans/ guided.htm

Govt. of Pakistan. (2000). *Education sector reform: action plan. (2001-2005)* (pp. 5), Islamabad: Ministry of Education.

Geban, O., & Onder, I. (2006). *The effect of conceptual change texts oriented instruction on students' understanding of the solubility equilibrium concept*. Retrieved from http://www.egitimdergisi.hacettepe.edu.tr/200630%C4%B0SMA%C4%B0L%20%C3%96NDER.pdf.

Khan, A. S. (2011). A Relationship study of Concept Formation Teaching Model and Students' Achievement. *Language in India, 11,* 188-204. Retrieved from http://www.languageinindia.com

McVittie, J. (2002). *Lesson 8: mother nature's marvellous menu 3: proteins.* Retrieved from http://www.usask.ca/education/coursework/mcvittiej/bio30unit1/lessons/lesson08.htm

Govt. of Pakistan. (1998). *National education policy (1998-2010).* (pp. 9), Islamabad: Ministry of Education.

Pınarba, T., Canpolat, A., Bayrakeken, S., & Geban, O. (2009). *The conceptual change approach to teaching chemical equilibrium.* Retrieved from http://www.informaworld.com/smpp/content~content=a749193601~db=all

Phoenix, M. (2006). *Advance organizer-introduction.* Retrieved from

http://imet.csus.edu/imet7 /phoenix/281advanceorganizer/advanceorganizer.htm

Planinic, M., Krsnik, R., Pecina, P., & Susac, A. (2008). *Overview and comparison of basic teaching techniques that promote conceptual change in students.* Retrieved from

http:// www.physik.uni-mainz.de/lehramt/epec/planinic_writeup.pdf

Rashid, M. (1998). Writing educational objectives. *Educational technology* (pp. 28-30), Karachi: Kamal Printers.

Richardson, S., & Reynolds, A. (2007). *Philosophy and education*. Retrieved from http:/www.hvrsd.k12.nj.us/beartavern/home/GuidedDiscovery.html

Siddiqui, M. H. (1991). Model of teaching-theory and research. New Delhi: Ashish Publishing House.

Vosniadou, S. (2007). *Conceptual change and education. human development*. Retrieved from http://content.karger.com/ProdukteDB/produkte.asp?Aktion=ShowPDF&ProduktNr= 224249&Ausgabe=232704&ArtikelNr=97684&filename=97684.pdf

Woolfolk, A. E. (1998). Learning and instruction. (7th ed.), *Educational psychology* (pp. 338- 339, 341), U.S.A: Allyn and Bacon.

Yavuz, A. (2005). *Effectiveness of conceptual change instruction accompanied with demonstration and computer assisted concept mapping on students; understanding of matter concept.* Retrieved from

http://66.102.1.104/scholar?hl=en&lr=&q=cache:oguQZrsKTvUJ:etd.lib.metu.edu.tr/upload/12605958/index.pdf+lesson+plan+format+for+concept+formation+in+chemistry

Zaidi, Z. H., & Rahman, M. A. (2008). *Chemical education in Pakistan. chemical education in Asia Pecific.* Retrieved from http://www.t.soka.ac.jp/chem/CEAP/ Pakistan.html