

The Impact of Concept Attainment Teaching Model and Mastery Teaching Method on Female High School Students' Academic Achievement and Metacognitive Skills

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Abstract: The objective of current study is the impact of concept attainment teaching model and mastery teaching method on high school female students' Academic achievement and metacognitive skills in Rezvanshahr city (Guilan, Iran). A research method has been a quasi-experimental through pre-test and post-test with two experimental groups and one control group. Statistical population included high school female students in Rezvanshahr city in 2012-2013 year. To do this study, three classes were selected by multistage sampling method, among students were randomly selected 45 students and were assigned randomly in groups of concept attainment teaching, mastery teaching and also control group that were used traditional teaching methods. Tools used include student academic achievement scores and metacognitive skills questionnaire. The validity of the questionnaire was confirmed by experts and its reliability by using Cronbach's alpha (0/79) was calculated. In order to analyze the data is used methods of descriptive statistics and inferential statistical such as multivariate covariance analysis (MANCOVA) and Posttest L matrix. Statistical analysis was performed by using SPSS software. Results showed that there is significant difference between experimental groups of concept attainment and mastery with control group and this difference have been due to mean adjusted to profit of experimental group ($ETA=0/628$ $\cdot P= 0/000$ $\cdot F(4\&78)=32/851$), according to findings of both methods of concept attainment teaching and mastery teaching with equal conditions affect academic achievement and metacognitive skills of students and thus these methods can be used to enhance student academic achievement and metacognitive skills in the classroom.

Keywords: Key words: Method of Concept Attainment Teaching, Mastery Teaching, Metacognitive Skills, Academic Achievement.

I. INTRODUCTION

The nature of this research in desired topic refer that in this method people intellectually in making their cognitive and mental contents will face with a state of imbalance so achieve understanding needs. Therefore each person will consider their ideas in front of unknowing and more and more learning method is necessary and active teaching will help active training methods and is kind of learning associated with the activities of experience and follow-up and discovery. In classrooms, teachers based on active model of problem oriented will used models of question and answer, discussion, brainstorming and problem solving and critical thinking and creativity. So that is formed mutual relationship between teacher and students and students intellectually [12].

Therefore all of them on the same subject and issue think and make comments or comparing opinions and have accuracy and have attention to the differences and conflicts, and seeks to provide a solution or a more complete meaning of the topic or issue. Thus in meaning of discovery and tracking people not only seeking to provide comments and answers, but propose appropriate question given the vague issues faced.

In teaching model of concept attainment, concept is a category or class of stimuli (objects, events, ideas, people and except them) in one or more common characteristics or features. Learning concept means placing objects or issues

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

in a class, thus it can identify the class members. Each concept has definition, title or name, concepts and principles constitute the bulk of the course content. We summarize world with conceptualization in our mind [11].

Concept has an important feature that knowing them will help the learner in better understanding of concept. It includes concept attribute, value of concept attribute, number of concept adjectives, adjectives of index, defining attributes, the original model, sample, classify concepts, objective and abstract concepts, concepts of combination and non- combination [3].

Concept attainment is:” search and list of manifestations that can be used to detect examples from non-examples of classes”. Receiving concept wants from a student that examples (which are called samples) and includes features (which are called manifestation) of concept compare and deal with other examples that don’t include manifestation and thereby discover manifestation of the category already exists in the mind of another person [6].

With this model is reinforced creativity, learning stability, making hypotheses, increased tolerance of ambiguity in learners. Model of receiving concept is family of information processing. These families are emphasized on strengthen internal tendency of human to understand the world through the collection and organization of primary information, explore issues and presenting solutions and create concepts and language of their transport. Jerome Bruner is the founder of this model. Concept attainment model is search and discover manifestations that is used for detecting examples from non-examples of classes. In other words, in this model learners compare examples that don’t includes manifestations and thereby discover subject manifestation that already exist in the mind of the teacher [1].

This model is important to learn how classification, how to think and how to receive the concept to students. In this model teacher is supporting and guidance of students’ assumptions. Moreover, it is already select and organizes in concepts of positive and negative samples and leads learners to achieve this concept. This model enables students to advanced conceptualizing, specific concepts, inductive reasoning, dominance and knowledge of the visions, perspectives, tolerance of ambiguity and sensitivity to logical reasoning in communication.

Table 1) stages of Teaching Model of Concept attainment

Steps	Teacher actions	Inclusive activities
First	Offering examples and non-examples In two columns (yes) or (no) or (+) and(-)	-Thinking and formulating hypotheses about the concept - Comparison of examples and non-examples -Naming concept in their minds
Second 1	Just provide examples, without putting them in two columns (yes) or (no).	Examples and non-examples of teachers placed in two columns (yes) or (no)
Second 2	-Recorded examples and non-examples of students -Confirm or reject of hypotheses - providing the name of the concept desired	Learners provide examples and are placed In the appropriate column
Third	-providing definitions of the concept -analyzing and summarizing Contents	-Talk about hypotheses - Description of their thoughts about the concept desired

When in minds of the students comparing and contrasting sets of samples, thus create the hypothesis that there are three important factors in their formation; first, it can create exercises of concept attainment to check how students thinking. Second, students are not only able to describe how to achieve concepts, but also change in way and learn use of new techniques learn more effectively. Third, changing the way of presenting information and with some changes in the model can affect the way of student’s process information.

Analysis how tendency of students to information related to samples is understand key of their leadership style to the concepts attainment. Students will focus on specific aspects of the information (partial strategies) or all or most of the information (general strategies) keeps in mind [6].

Outcomes of education this teaching model is the following: Considering nature of the course concepts, understanding conceptual systems, tolerance in ambiguity, learning strategies of achieving concepts, inductive reasoning, and flexibility in exploring the concept [6].

Mastery learning is framework that Based on it, education can become sequentially. This model has developed by John B. Carroll (1971) and Benjamin S. Bloom (1971). Mastery learning is organized and interesting way that

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

accordingly it increases the probability of reaching more students to satisfactory level of work in course categories. Terms of talent refers as the amount of time and the required opportunities students to learn articles and is not their ability to master the articles [2].

Therefore, the teaching objectives can be seen in the following components:

- 1 - Create the conditions for learning for all students
- 2 - Considering differences in individual
- 3 - Increasing knowledge of students skills
- 4 - The same classroom learning efficiency

Some research indicates that if all of student has be learning opportunities required and quality of education also is suited to their individual needs, 95% of students will achieve mastery learning course material. in conventional teaching, learning time is basis, it means That is struggling students are trained and learned according to the same time but according to individual differences among learners is not similar the efficiency of such training and all students wont achieve learning goals. But in mastery learning, mastery is most basic concept that also this mastery are associated to learning efficiency and performance levels. Mastery concept is very close to the concepts of skill. Skill of individual efficacy refers to using her/his learning. It Means first student must be dominate working and then achieve the skills, so it can be said that mastery is prerequisite f skill [1].

Teachers should be regular done stage assessments and final to understand mastery and skills of students during use this model. It said that underlying mastery learning facilitation is practice of step by step examples about concepts and new skills of explanatory words, avoid impatience and re-explain difficult points. It is important to provide feedback by the teacher and also students [7].

Implementation stages of mastery teaching model

First Stage: Preparation of lesson

- A) Specify the objectives or objective of lesson.
- B) Determining the relationship between course content with students' prior learning.
- C) Determining responsibility of the students to practice and learn.

Second stage: providing lesson

Teachers at this stage will focus on concepts and skills proposed in the form of lesson objectives and it works:

- A) Explaining the new concept.
- B) Determining steps to skill
- C) Providing appropriate training tools.

Third Stage: practice regularly

At this stage, student's practice is related to teacher instruction.

- A) Teacher leads students according to the steps specified in stage 2.
- B) Teacher revise Students mistakes, are praised their achievements.
- C) Teacher determines the principles of teamwork to achieve the course objectives. (Helping each other, respecting the arrangement, mutual respect, having the same purpose)

Forth Stage: Guided Practice

At this stage, the teacher guides students to semi-autonomous programs that include:

- A) The provision of appropriate practice
- B) Review of practices
- C) Provision of corrective - Strengthen feedback

Fifth Stage: Independent practice

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

Teacher is driven student with two stage depends teacher and semi-autonomous to achieve skills and concepts learning. Actions of teacher in this stage:

A) S/he will be determined assignments for independent learning activities in class and home.

B) Student findings will investigate and provide necessary feedback [6].

Yaghini (2008) in study with title "Evaluating the effects of concept attainment teaching model and traditional on the learning concepts of numerical mathematics during preschool from the perspective of educators In Shiraz" concluded that there is relationship between preschool children learning who trained numerical mathematics concepts by concept attainment and children in traditional group. It suggests educators of preschool centers that this model is used to enhance the power of thought and analysis in teaching their lessons [2].

Chalmeh & et al (2012) provide practical sample of mastery teaching method on learning in first grade of primary school. Teachers in using this method should done stage assessments and final to realize the extent of students' skills and mastery regularly. So it can say that underlying mastery learning facilitation is practice step by step, examples about new concepts and skills of explanatory speech [4].

In research by Fraizer (1999) in Randolph Macon Woman's College, Fraizer introduced model of concept attainment, goals, teacher duty and students and the application of this model from preschool to high school, meanwhile the effectiveness of this model in various learning introduced constructive material of sweets and differences between meat foods, vegetable foods and restaurant foods by using concept attainment [5].

Joyce & et al (2000) in research investigated the effects of concept attainment model in learning Persian language and literature. Joyce in providing concept attainment model in in the course of language classified words according to sound in primary and middle school and high school courses.

Samantha and colleagues (2003) in research investigate positive effect on learning in use of concept attainment in arguing metaphor and introducing a variety of offering samples and they introduced offering a variety of sample such as:

- 1 - Offering all of positive samples before and after the offering negative examples
- 2 - Offering all of positive and negative samples, without stating its positive or negative
- 3 - Identify the basic features and the selection of positive examples for the concepts learned in class.
- 4 - Use this template as a group activity [8].

Newby & Ertner (2007) the mean effect size for teaching concept attainment has reported 0/65 that there is alignment between the findings. Results showed that mastery model causes to mastery students to learn the material and mastery in performance [10].

Slowin & Karoit (1980) were performed cooperative learning strategies, mastery learning and a combination of both in mathematics of ninth grade in Philadelphia schools. Results of this study showed that will increased academic achievement of students, especially in primary school significantly [9].

Mevaecc (1990) investigated academic achievement many of third and fifth grade students who have different educational backgrounds in cooperative learning groups, mastery learning and integration method. Research results of Mevaecc showed that mastery learning and cooperative have been positive effects on students [5].

II. RESEARCH HYPOTHESES

1- Teaching Model of concept attainment and mastery affect levels of academic achievement and cognitive skills of female students.

2- Teaching Model of concept attainment and mastery affect levels of academic achievement of female students.

3- Teaching model of concept attainment and mastery affect cognitive skills of female students.

III. RESEARCH METHODOLOGY

a) Study Type

Research method in this study is quasi-experimental. Because subjects are human and research in the field of behavioral science is in teaching process of concept attainment and mastery and according to in many natural - social situations cant totally controlled available variables in the scope of the study. Researcher can use the method of quasi-

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

experimental with control group inequality. But the researcher is trying to closely own research method to experiment by Further identification of variables and raising own awareness.

Table 2. Research projects of pre-test and post-test with control group

Experimental group1	$T^1 T^2$	X^1	$T^1 T^2$
Experimental group 2	$T^1 T^2$	X^2	$T^1 T^2$
control group	$T^1 T^2$	-	$T^1 T^2$

T^1 : experimental group of mastery T^2 : experimental group of concept attainment

B) The statistical Population and sample: statistical population includes all first-grade high school female students in Rezvanshahr city that according to the department of education are 415 students. Selected sample groups of the population were 45 students that are in three experimental groups of 15 students concept attainment and experimental groups of mastery and control group in three-class of a school. It should be noted that students of three classes in terms of cultural characteristics - economic and social are similar. The samples were randomly selected and targeted.

C) Tools of data collection: in this study the researcher made questionnaire is used for students metacognitive skills, the questionnaire was made based on a Likert scale with four response categories including weight of ever (value 3), usually (value 2), sometimes (value 1) and never (value 0). However, since the two types of positive and negative questions were used in the questionnaire, it is obvious that positive questions are graded from right to left and negative questions are graded from left to right. Of course only questions of 4 and 9 have been designed negatively and the rest of questions are positive. Accordingly, the minimum and maximum value of subjects is obtained possible respectively from zero to 63 in this test.

D) Method of data analysis: To analyze the data obtained was used descriptive and inferential statistical methods. In descriptive statistics is used chart, the mean and standard deviation and in inferential statistics is used MANCOVA test and posttest L Matrix to evaluate research hypotheses. All of statistical analysis was performed by using SPSS software.

IV. RESEARCH FINDINGS

Results of multivariate covariance analysis for each variable are shown in Table 3.

Table 3. Multiple covariance analysis F for combined variable

source	value	F(2,40)	sig	Eta
combined variable (Group)	0/139	32/851	0/000	0/628

Ratio of the multivariate F has been obtained from approximation of Wilks Lambda. Eta value in the above table is share of the variance that is related to new combined variable. The general rule is such that if this value is greater than 14/0, thus levels of effect will be high. The value in the above table for the new combined variable of group is 0/628; this indicates a high effect. Also results of Wilks Lambda test about the combined variable is significant and significant in new combined variable shows that participants in both groups are different and group mean is significantly affected by the independent variable.

Table 4. Results of covariance analysis of the dependent variables

Variables	F(25,1)	P	ETA
metacognitive skills	27/144	0/000	0/576
academic achievement	62/207	0/000	0/757

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

Analysis of covariance (ANCOVA) also shown in table. Considering it has two dependent variables, with dividing 0/05 on 2 has been performed Bonferroni correction. Then a significant level is less than 0/25, this is true in both variables. Eta values indicate that approximately 60% of the variance considered in metacognitive skills, and approximately 80% of the variance considered in academic achievement for the group variable.

Table 5. paired-comparisons of means in posttest of metacognitive skills and academic achievement in three groups

groups	Metacognitive skills		Academic achievement	
	difference the mean	P	difference the mean	P
concept attainment and mastery	7/127	0/000	0/081	1/000
concept attainment and control	12/476	0/000	3/811	0/000
Control and mastery	5/349	0/011	3/892	0/000

The figures of above table show that there is significant difference between the mean of post-test metacognitive skills and academic achievement in three groups: control and concept attainment and mastery.

1- There is significant difference between the mean of metacognitive skills in concept attainment group with mean of metacognitive skills in mastery group; and this difference has benefit for concept attainment group.

2- There is significant difference between the mean of metacognitive skills in control group with mean of metacognitive skills in concept attainment group; and this difference has benefit for concept attainment group.

3- There is significant difference between the mean of metacognitive skills in control group with mean of metacognitive skills in mastery group; and this difference has benefit for mastery group.

4- There isn't significant difference between the mean of academic achievement in concept attainment group with mean of academic achievement in mastery group; and this difference has benefit for mastery group; Effectiveness is the same for both groups.

5- There is significant difference between the mean of academic achievement in control group with mean of academic achievement in concept attainment group; and this difference has benefit for concept attainment group.

6- There is significant difference between the mean of academic achievement in control group with mean of academic achievement in mastery group; and this difference has benefit for mastery group.

5. RESEARCH RESULTS

A) 1- Teaching model of concept attainment and mastery affect levels of academic achievement and cognitive skills of female students.

Rashidi (2012) provide the application of concept attainment in mathematical. He introduced concept attainment as active student-centered method and effective method for teaching concepts and definitions in mathematics. Yaghini (2008) in research entitled evaluating the effects of concept attainment teaching model and traditional on the learning concepts of numerical mathematics suggests to educators of preschool that this model use to enhance the power of thought and analysis of this model In their training lessons. Chalmeh & et al (2012) provided practical sample of mastery teaching method on the first grade learning in primary school. Research result of Hutton Loucher (1962) showed that learning concepts in conditions of use positive and negative examples together is better the use of positive and negative examples alone. In condition of using negative examples, learning was done the most difficult aspects.

Joyce & et al (2000) in research investigated the effects of concept attainment model in learning Persian language and literature. In his report positive noted impact of this model in sound training. Samantha & other (2003) in research investigated the positive effect of learning in using concept attainment model in metaphor reasoning and introduced offering a variety of sample. Fraizer (1999) introduced model of concept attainment, goals, teacher duty and students and the application of this model from preschool to high school, meanwhile the effectiveness of this model in various learning. Newby & Ertner (1994) the mean of effect size for teaching concept attainment has reported 0/65 that there is alignment between the findings. Results showed that mastery model causes to mastery students to learn the material and mastery in performance. Slowin & Karoit (1980) were performed cooperative learning strategies, mastery learning and a combination of both in mathematics of ninth grade in Philadelphia schools. Results of this study showed

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

that will increased academic achievement of students, especially in primary school significantly. Mevaecch (1990) investigated academic achievement many of third and fifth grade students who have different educational backgrounds in cooperative learning groups, mastery learning and integration method. Research results of Mevaecch showed that mastery learning and cooperative have been positive effects on students.

The findings of current study concluded that there isn't significant difference between the experimental group influenced by concept attainment and mastery and control group without training ($ETA=0/628$, $P=0/000$, $F(4, 78) = 32/851$) and this difference has benefit for groups trained.

b) Teaching model of concept attainment and mastery affect levels of academic achievement of female students.

Rashidi (2012) provided the application of concept attainment model in the mathematical. He introduced concept attainment as active student-centered method and effective method for teaching concepts and definitions in mathematics. Yaghini (2008) in research entitled evaluating the effects of concept attainment teaching model and traditional on the learning concepts of numerical mathematics suggests to educators of preschool that this model used enhance the power of thought and analysis of this model in their training lessons. Joyce & et al (2000) in research investigated the effects of concept attainment model in learning Persian language and literature. In his report noted positive impact of this model in sound training. Samantha & other (2003) in research investigate the positive effect of learning in using concept attainment model in metaphor reasoning and introduced offering a variety of sample.

The findings of current study concluded that there is significant difference between adjusted means of two group in academic achievement ($ETA=0/757$, $P=0/000$, $F(2, 40) = 62/207$).

1-1- There isn't significant difference between the mean of academic achievement in concept attainment group with mean of academic achievement in mastery group; effectiveness is the same for both groups.

1-2- There is significant difference between the mean of academic achievement in control group with mean of academic achievement in concept attainment group; and this difference has benefit for concept attainment group.

1-3- There is significant difference between the mean of academic achievement in control group with mean of academic achievement in mastery group; and this difference has benefit for mastery group.

c) Teaching model of concept attainment and mastery affect cognitive skills of female students.

Chalmeh & et al (2012) provided practical sample of mastery teaching method on the first grade learning in primary school. Tennyson and et al (1986) conducted that students' knowledge based practice process (how concept attainment) is obtained in practice. Thus, in their view, the analysis of thought is very important to facilitate meta-cognitions learning of concept attainment. Fraizer (1999) introduced model of concept attainment, goals, teacher duty and students and the application of this model from preschool to high school, meanwhile the effectiveness of this model in various learning. Newby & Ertner (1994) the mean of effect size for teaching concept attainment has reported 0/65 that there is alignment between the findings. Results showed that mastery model causes to mastery students to learn the material and mastery in performance. Slowin & Karoit (1980) were performed cooperative learning strategies, mastery learning and a combination of both in mathematics of ninth grade in Philadelphia schools. Results of this study showed that will increased academic achievement of students, especially in primary school significantly. Mevaecch (1990) investigated academic achievement many of third and fifth grade students who have different educational backgrounds in cooperative learning groups, mastery learning and integration method. Research results of Mevaecch showed that mastery learning and cooperative have been positive effects on students.

The findings of current study concluded that there is significant difference between adjusted means of two group in academic achievement ($ETA=0/576$, $P=0/000$, $F(2, 40) = 27/144$). In other words, there is significant difference between two experimental methods to increase metacognitive skills and academic achievement of female student with control group.

2-1- There is significant difference between the mean of metacognitive skills in concept attainment group with mean of metacognitive skills in mastery group; and this difference has benefit for concept attainment group.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 2, February 2014

2-2- There is significant difference between the mean of metacognitive skills in control group with mean of metacognitive skills in concept attainment group; and this difference has benefit for concept attainment group.

2-3- There is significant difference between the mean of metacognitive skills in control group with mean of metacognitive skills in mastery group; and this difference has benefit for mastery group.

In humanities researches that researcher faces with humans in open social conditions and naturally features of every person is different from other human, thus it cannot be claimed that research be without defects and mistakes. Time limit to answer questions in a questionnaire was a limitation of this study.

Small classroom and inappropriate physical condition of classes (light, chair, etc) is barrier for these methods. Overpopulation in class can decrease the success of these methods. Student community has been considered in this research studies. So should be cautious in generalizing the results to the student community.

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