

THE EFFECT OF COGNITIVE AND METACOGNITIVE STRATEGIES TEACHING ON LEARNING OF THE STUDENTS OF TARBIATMOALEM OF SHAHIDRAJAYI OF QAZVIN

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Abstract

The present study aimed to investigate the effect of cognitive and metacognitive strategies teaching on learning of the students of TarbiatMoalem of ShahidRajayi of Qazvin. The study was quasi-experimental design. 45 students of three classes who selected educational media in the second semi-term of associate level in elementary education during 2006-2007 academic year were selected by Sadeghi random sampling method. A researcher-built test was used with 30 multiple choice (4 items). The reliability of the questionnaires was estimated by Kuder-Richardson 21(KR21) AS 0.78. The data analysis was done by descriptive statistics (frequency, percent and mean) and inference statistics (correlated-t). The results of correlated t calculation indicated the effect of cognitive strategies teaching on better performance improvement in learning educational media course. The results showed that cognitive strategies training led to the better performance in learning educational media course.

Keywords: Learning, Meta cognitive strategies, Cognitive strategies, TarbiatMoalem

Introduction

Indeed, it can be said that the importance of learning in one's growth is beyond the vision of his thoughts. The psychologists recently found about the great formation of human being, even in the early years and they believed that the main factor of this formation is learning. They believe that our behavior is the effect of learning and it means that a series of simple learning leads to the complex learning and as the living environment of people is always varied, human being is obliged to learning to cope with these changes (Parsa, 1995).

Various learning approaches namely News process as one of the learning cognitive approaches causes that people manipulate their information and apply the methods for information processing and they are called learning strategies or cognitive and metacognitive strategies. According to Ganie (1985) cognitive strategy is a control process, internal process by which the learners select and change consideration, learning and thought methods (cited in Ali Abadi, 1995).

Cognitive strategies help us to prepare the new information to combine with the already learnt information and their storage in long-term memory. Most of the learners need training in self-discipline, self-control, problem recognition and the like and they can learn learning only when they master general meta cognitive strategies (Seif, 2006).

Meta cognition is one's ability for identification of strengths and weaknesses (AghazadeandAhadian, 1998). Today, face to face transferring of traditional teaching methods as lecture is not adequate to meet the demands of people, society and creating permanent change in people behavior. Thus, we should use educational technology and recognition of educational

techniques and their applications. However, unfortunately educational technology is not used well to teach learning.

Educational technology is like a sparkling light making the path clear for the teachers in education department. According to educational technology commission of USA, educational technology is the systematic method of design, implementation and evaluation of total learning and teaching process based on the definite goals. Also it is based on the researches regarding learning and human communications and human and non-human resources to provide more effective, stable and deep learning and teaching (Ahadian et al., 2002).

The educational technology goal is the identification of educational techniques and their application in practice. To solve each problem, educational technology at first defines the goal and after the system analysis and identification of the problems defines the practical method of the problem and required tools to achieve the goal. The evidences indicated that educational technology is not used well in training and teaching the teachers. One of the reasons is that our students don't learn educational technology knowledge components meaningfully in Teacher training centers. The present study attempted to investigate whether learning strategies (cognitive and meta cognitive strategies) have any influence on learning educational technology course in teacher training centers?

Based on the previous mentioned reasons, the present study attempted to teach the students and teachers (administrators of teaching in the schools) of teacher training centers to learn educational techniques and practical applications and using educational media in teaching by cognitive and metacognitive strategies. In other words, they can learn how and why they can use educational technology.

Theoretical framework

Indeed, learning is the most important mental phenomenon in human being and it is the basis of the difference of human being from other creatures from psychological aspects. If we consider the life of animals and people in the past, we can see the animals in thousands years ago were not different from the animals in our era. They live as the lived in 5 or 10 years ago. However, the primary men using stone and wood for hunting were living above the trees or inside the caves and there were considerable changes in all their life aspects in various historical periods and now they achieve considerable progresses that were impossible in the past. The contemporary man is not only aware of the farthest locations on earth but also he is aware of the depth of oceans and the magnificence of the galaxies. 20th century human being is dominant on his life style compared to the past centuries. All the advancements are dependent upon teaching and learning (Parsa, 1995, 20).

Any person needs new behavior in each period of life and this is only possible via learning. The importance of learning is obvious when we are deprived of what we learnt. Although we are mature physiologically, we return to childhood period from mental aspects. Thus, in this case , we don't know how to fulfill all our physiological needs as hunger and thirst(Shoarinejad, 1999).

Learning concept can be defined by various forms, acquiring knowledge and information, various habits, various skills and various methods of problem solving. Also, learning can be defined as learning the good behaviors and even achieving the harmful and bad behaviors.

Learning covers an extensive field. Elson and Hergnehan (2012) believed that learning is one of the important fields in current psychology and one of the most difficult concepts for defining. Various definitions are presented for the importance of learning.

According to Hoy and Miskel (2005) learning is the process referring to the change of knowledge or individual behavior. Although most of the experts and researchers agree with this general situation in learning, some of them emphasize on the behavior change and others on individual knowledge change and his cognitive structure.

Learning is a relatively stable change in potential ability to do definite behavior. This potential ability is the result of experience with the set of environmental affairs with special relation with the required behavior (Damian, 2008, 26).

Anderson (2005:4) defined learning as a process acquired by relatively stable changes in behavioral capability as the result of experience. Various classifications of learning strategies are presented. Generally, learning strategies are classified into two groups including metacognitive and cognitive strategies (JafarTabatabayi, 2012).

a. Cognitive strategies

Cognitive strategies are used mostly in referring to the mental activities as thinking, perception and reasoning. Indeed, these strategies are used to facilitate learning and doing the assignments and help the students to prepare the new information to be combined with the previous information and facilitate their storage in long-term memory. These strategies as learning tools are including : Repetition or review strategies, semantic development and organizing (DerakhshanHure, 2010). These strategies are applied both for simple and memorizing assignments and more complex assignments needing the understanding (Mafakheri and Motamedi, 2011).

Cognitive strategies are any behavior, thinking or practice with the aim of learning, organizing and knowledge storage and facilitation of using them in future (Bakhshi and Ahanchian, 2013).

Cognitive strategy is any behavior, thought or practice being used by the learner during learning and its aim is helping the learning, organizing and storage of knowledge and skills and easy application in future (Vanistain and Hayum, 1998, cited in Seif, 2006).

Handri (1994, cited in Mafakheri and Motamedi, 2011), considers cognitive strategies by some methods for problem solving. He believes that cognitive strategies are explorations for data processing. People need ordering the external stimulations, scientific and creative activity and to do this, cognitive strategies fulfill this need.

Metacognitive strategies

Metacognitive strategies are some tools to guide cognitive strategies and controlling them. These strategies are defining goal for learning, raising question about the items that are read, evaluation of what is read and regulating the study speed and learning. In other words, learner uses cognitive strategy at most by metacognitive strategies (Ebrahimi, 1998, cited in DerakhshanHure, 2010).

The term metacognition is one's knowledge of his cognitive processes and optimal use of them to achieve learning goals. In other words, metacognition is one's knowledge or awareness of his cognitive system (Mafakheri and Motamedi, 2011).

Gage and Berliner (1994, translated by Lotfabadi et al., 1995) referred to metacognition as knowledge and control of cognitive performance. They stated that as the children grow, gradually they find which efforts and cognitive processes are suitable for which successes and when they should attempt and when they shouldn't and how to control their mental activity.

Metacognitive strategies are based on supervision and are used for supervising the cognitive strategies and controlling them. These strategies are classified into three aspects of planning, control and supervision and discipline strategies (Bakhshi and Ahanchian, 2013).

Metacognitive strategies are acquiring knowledge and recognizing the strengths and weaknesses of their cognitive activity and guide a person in cognitive activities and is supervising strategy and is used in supervising the cognitive strategies and guiding them (Zimmerman, 2003).

Review of Literature

Fazeli (2006) conducted a study “the comparison of the effect of cognitive and metacognitive strategies on ICT basic learning among the boy students of third of guidance school in non-profit schools of district 1 of Tehran during 2006-2007 and he found cognitive and metacognitive strategies training have positive effect on students’ performance in learning ICT basics. The results of their study showed that the effect of teaching cognitive and metacognitive strategies was similar but the effect of cognitive and metacognitive strategies training separately and educating these strategies together had significant difference. The group who underwent learning strategies as mixed, had better performance to the rest of groups.

Yaghubi (2004) in a study “the effect of training metacognitive strategies on improvement of reading performance of the dyslexia students” found that teaching metacognitive strategies had positive effect on correcting the reading errors of the participants of experiment group in fourth and fifth of elementary school. Also, the results showed that there was no significant difference between experiment and control groups in pre-test between the means but performance improvement was done after doing metacognitive strategies training about 27.4 in experiment group and 0.65 in control group and this showed the reduction of the reading errors in experiment group and this performance improvement was significant statistically.

Nadi et al. (2011) performed a study “the effect of teaching critical thinking, problem solving and metacognition on self-directed learning among the students” on 50 students of Azad University of Khorasegan. They found that teaching critical thinking, problem solving and metacognition had significant effect on self-directed learning and its components (self-management, tendency to learn and self-control). Based on data analysis, critical thinking training, problem solving and metacognition, the total self-directed learning and its components (self-management, tendency to learn and self-control) are increased.

Veen man et al (2004) in a study “The investigation of the relationship between intelligence and metacognitive skills among the fourth, sixth and eighth level and the students” found the following results: 1) Mastering the metacognitive skills is a general issue. 2) Metacognitive skills are mostly dedicated to personal features than specific field. 3) Metacognitive skills independent from intelligence ability lead to learning performance development.

Veen man and Beishuizen (2004) in a study “Intellectual and metacognitive skills of novice while studying texts under conditions of text difficulty and time constraint” showed that metacognitive skills are associated with intelligence but they were effective on studying texts.

Given and Reid (1999) conducted a study regarding the learning skills of dyslexia children and found that dyslexia is a problem associated with information processing and cognitive and metacognitive skills are effective on learning process, understanding and training the effective strategies can be important in solving their problems.

Meloth (1990) investigated the relationship between metacognitive teaching and reading performance. In this study, the students of 20 classrooms of the third level participated and underwent trainings about reading strategies. The results showed that subjects’ metacognitive knowledge was increased during the academic year. Generally, it can be said that the researches on cognitive and metacognitive strategies showed that when people use these strategies, they act better in learning skill. Recently, these strategies are turned into an unavoidable necessity and via these strategies, we can improve learning among the students and university students.

Based on the role of cognitive and metacognitive strategies in learning improvement and the importance of these skills on people behavior and attitudes, the present study attempted to investigate the effect of cognitive and metacognitive strategies on students learning. Indeed, considering such issue can enrich literature of cognitive and metacognitive strategies and related learning and variables. Based on the conceptual framework of the study, the following hypotheses were tested:

- 1- Teaching cognitive strategies lead to better performance of learning educational media course.
- 2- Teaching metacognitive strategies lead to better performance of learning educational media course.

Study method

The present study is applied in terms of purpose. The goal of applied researches is applied knowledge development in a specific field (Sarmad et al., 2007). These researches attempt to find some ways to solve organizations and institutions problems. The present study investigated the effect of teaching cognitive and metacognitive strategies on learning of students in teacher training center of ShahidRajayi of Qazvian. This study is applied as its results can be applied in the study population. This study is quasi-experimental based on data collection. We can manipulate independent variable in a quasi-experimental test and create the conditions in which the independent variable affects dependent variable. In this method, we can not randomly divide the subjects into control and experiment groups (Sarmad et al. , 2007). Multi-group Pre-test and post-test was used in the study. The study population was the students of teacher training center of ShahidRajayi of Qazvin as 595 people. The sample size was 45 and they were among the students of three classes learning elementary teaching course of associate level of medical medias in the second semi-term of academic year 2006-2007 and they were selected by simple random sampling in three 15-people group as mixed (in terms of gender) and they underwent learning strategies. Researcher-built test was used in the study with four-item, 30 questions. The reliability of the questionnaires was estimated by Kuder-Richardson 21(KR21) as 0.78. The data analysis was done by descriptive statistics (frequency, percent and mean) and inference statistics (independent-t).

Study results

Hypothesis: Teaching cognitive strategies leads to better performance of students in learning educational media.

Based on the mentioned hypothesis and to show the difference between the mean of the pre-test and post-test scores of educational media course, the cognitive group , correlated-t test was used and the result is shown in Table 1.

Table 1- The result of t-test in educational media course in cognitive group

Significance level	t	Degree of freedom	Standard mean error	Mean	Number of n	Statistical indices
						Test
0/000	9/81	14	1/01	11/86	15	Pre-test
			0/90	17.26	15	Post-test

Based on the results in Table (3-4), the calculated t is 9.81 and degree of freedom is 14 and the difference of the means of pre-test and post-test scores in educational media of cognitive group subjects is greater than significance level 0.01.

Second hypothesis: Teaching metacognitive strategies leads to better performance of the students in learning educational media.

Correlated-t test is used to indicate the difference between the mean pre-test and post-test scores of educational media course of metacognitive group subjects. The result of this test is shown in Table 2.

Table 2- The result of t-test in educational media course for metacognitive group

Significance level	t	Degree of freedom	Standard mean error	Mean	Number of n	Statistical indices
						Test
0/000	9/26	14	0/54	8/06	15	Pre-test
			0/90	14/80	15	Post-test

As shown in the above table, the calculated t is equal to 9.26 and degree of freedom is 14 and the difference between pre-test and post-test means in educational media course is greater than significance level 0.01.

Discussion and Conclusion

First hypothesis: Teaching cognitive strategies leads to better performance of students in learning educational media course.

As it was said, correlated-t test was used for the first hypothesis study analysis and to compare the difference between the mean pre-test and post-test scores of the experiment group learning cognitive strategies. T-value and degree of freedom were 9.81 and 14, respectively in educational media course.

Based on this result, the difference between the mean pre-test and post-test scores in educational media course was significant at 0.01 and greater level. Thus, null hypothesis is rejected and the study hypothesis is supported at level 0.01. It can be said that teaching cognitive strategies leads to the improvement of students' performance in learning educational media course. This result is consistent with the previous results. Fazeli (2006) in a study found similar results and believed that teaching cognitive strategies increases and improves the students' performance in learning computer and internet basics. TakmiliTorabi (2004) conducted a study and found similar results and found that teaching cognitive strategies had positive effect on self-directed learning of the students. Ostovar (2001) achieved the consistent results with the present study. He found that teaching cognitive strategies had positive effect on performance of the students in learning sciences assignment. Generally, teaching cognitive strategies in various textbooks and various age groups can increase and improve students' performance.

Second hypothesis: Teaching metacognitive strategies leads to better performance of the students in learning educational media course.

As it was said already, in this hypothesis, correlated –t test was used to compare the mean and pre-test and post-test scores of experiment group learning metacognitive strategies. The pre-test and post-test were based on educational media course. The result of educational media course was as: the calculated t was 9.26 and degree of freedom 14.

Based on this result, we can say the different between the mean pre-test and post-test scores in educational media course in this group was significant at 0.01 and above it. Thus, null hypothesis is rejected and H1 is supported. We find teaching metacognitive strategies training increases and improves students' performance in learning educational media course. Various researches supported the above results as the following researches:

Fazeli (2006) in a study found the similar results and stated that teaching metacognitive strategies increases student's performance in learning computer and internet basics.

Azami (2005) found the following results:

- 1- Metacognitive strategies increase the comprehension of students.
- 2- The effect of metacognitive teaching strategies is fixed over time among the experiment group students.
- 3- The effect of metacognitive strategies teaching was similar on history and social sciences textbooks and it increased the comprehension in both of them.

Yaghubi (2004) in a study found that teaching metacognitive strategies had positive effect on correcting the errors of reading of the experiment group in both fourth and fifth of elementary school. Motevali (1997) in a study found consistent results. He found about the positive effect of teaching metacognitive strategies on comprehension, reading and learning speed of the students.

Oshia and Oshia (1997) in their studies found that teaching metacognitive skills lead to more self-regulation and it improves the students' performance.

Applied recommendations

- 1- A course titled learning and study strategies is considered in the universities and teacher training centers and such course is also considered for elementary, guidance and high school levels.
- 2- Educational workshops and training classes besides giving services to teachers teach planning and appropriate methods of the study to change their traditional view to study methods.
- 3- It is recommended to the lecturers and teachers to use cognitive and metacognitive strategies in their teaching and encourage the students to use them.
- 4- If the teachers are faced with time limitation in using the strategies, it is recommended to explain these strategies by exact planning in various teaching sessions.
- 5- It is recommended to the teachers to use the cognitive and metacognitive strategies as combined as they have more effectiveness and these two strategies complement each other.

Persian resoruces:

Aghazade, Moharam, Ahadian, Mohammad. 1998. The theoretical basics and training applications of metacognition theory. Tehran. Nopardazan publications.

Ahadian, Mohammad. 2002. Providing and application of educational materials. Tehran. Payam-e Noor publications.

Ostovar, Nega. 2001. The comparison of effectiveness of training cognitive and metacognitive strategies in improving the performance in sciences assignment. MA thesis. Psychology and educational sciences school. AlameTabatabayi University.

Elson, Matiu, H. Hergenhan, B. R. 2006. An introduction to learning theories. Translated by Ali Akbar Seif. Nashr Dana.

Bakhshi, Mahmood, Ahanchian, Mohammad Reza. 2013. The model of prediction of academic progress: The role of critical thinking and self-regulating strategies of learning. Iranian journal of training in medical sciences. 13(2):153-163.

TakmiliTorabi, Tolu. 2003. The study of effectiveness of training of cognitive and metacognitive strategies on learning of students of fifth of elementary school of Tehran. MA thesis. Psychology and educational sciences school. AlameTabatabayi University.

- JafarTabatabayi, Samane Sadat; Banijamali, Shokuh Sadat, Ahadi, Hassan.Khamesian, Ahmad. 2012. The effect of training self-regulative learning strategies on academic achievement and anxiety of the psychology students of Islamic Azad University of Birjand. *New care.Scientific journal of nursing and midwifery school of Medical sciences university of Birjand.*9(4)-292-300.
- Damian, Michel. 2008. *The basic principles of learning and conditions.* Translated: Reza Zamani and FiroozeTaherpoor.Rosh publications.
- Derakhshan, Hure. Khadije. 2010. Self-regulating learning. *Educational technology development journal.* 4(26):27-29.
- Seif, Ali akbar, 2006. *Educational psychology (learning pscyology and education).* Tehran. Agah publication.
- Shoarinejad, Ali Akbar. 1999. *Learning psychology and its application in training.* Tehran. Tus.
- Azami, Adel. 2005. *The study of the effect of training metacognitive strategies on comprehension, reading of the boy students of guidance school of Maraghe town.* MA the sis.Psychology and educational sciences of Tehran University.
- Fazeli, Qorban. 2006. *The comparison of the effect of teaching cognitive and metacognitive strategies on learning ICT basics among the boy students of third of guidance school of non-profit of district 1 of Tehran during academic year 2006-2007.* MA thesis.Psychology and educational sciences of AlameTabatabayi University.
- Ganie, Aram; Brigz, Lesli J. Viger, Walter W. 1995. *The principles of educational design.*TranslatedKhadije Ali Abadi, Tehran.Dana edition.
- Gage, Benet. David, C. 1995. *Educational psychology.*Translated by QolamrezaKhoynejad et al., Mashhad.Ferdoosi publications.
- Motevali, Mohammad. 1997. *The effect of teaching metacognitive strategies education on reading, comprehension and learning speed of the students of first of high school of Ferdooi town.* MA thesis.Psychology and educational sciences of AlameTabatabayi University.
- Mafakheri, Abdollah; Motamedi, Abdollah. 2011. *The study of the self-regulative learning among the Quran reciters and non-reciters.* *Religion and psychology.* 4(2):99-122.
- Nadi, Mohamamd Ali; GordanShekan, Maryam, Golparvar, Mohsen. 2011. *The effect of critical thinking, problem solving and metacognition on self-directed learning among the students.* *Research in curriculum.* Year 8, Period 2, No. 1, 2 (serial 28, 29): 53-61.
- Yaghubi, Abolghasem. 2004. *The effect of teaching metacognitive strategies on improving reading performance of dyslexia boy students of fourth and fifth of elementary of Hamedan city.* PhD thesis.Psychology and educational sciences of AlameTabatabayi University.

English Reference

- Anderson, John.R. (2005) **Learning and Memory (An integrated approach)** Carnegie Mellon University
- Given ,B.K. and Reid .G. (1999). **Learning styles . A Guide for teacher and parents .Red rose publications, landcashive.** [on line] Available: <http://www.bdiinternationalconference.org>
- Hoy,w.k. and Miskel,C,G.(2005) **Educational admistration (Thory , research andpractice)**,newyork,Randomhous.
- Meloth, M.S.(1990). Changing in poor reades knowledge of cognition and the association of knowledge with. Regulation of cognition and reading comprehension.**Journal of Educational psychology**, 82,792-798.

- Veenman , M.V.J and Beishuizen, J.J. (2004). Intellectual and metacognitive skills of novice while studying texts under conditions of text difficulty and time constraint .**The journal on learning and instruction**, Volume 14. Number 6.
- Veen man, marcel, V.J & Wilhelm , pascal and Beishuizen, jos.J(2004) .The relation between intellectual and meta cognitive skills from a development perspective ,**the journal of the European Association for research on learning and instruction** . Volume 14, Number 1.
- Zimmerman, B.j (2008).Investigating self –regulation and motivation: Historical background, methodological developments and future prospect, **American educational research journal**, vol.45, no.1, pp: 166-183.