The present study aimed to investigate the effect of combined cognitive and metacognitive strategies on learning of the students of Tarbiat Moalem of Shahid Rajayi 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 simple 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 combined cognitive and metacognitive strategies on better performance improvement in learning educational media course. The results showed that combined cognitive and metacognitive strategies teaching led to the better performance of the students in learning educational media course compared to two other strategies.

Keywords: Learning, Meta cognitive strategies, Cognitive strategies, Tarbiat Moalem

1. Introduction

Learning is a process. Various factors and variables interact in each process. In the past it was believed that learning process of each person is dependent upon his intelligence and talents. Recently, this theory was more common among the psychologists. Despite the important role of inherent intelligence and talent factors in learning, other non-inherent factors are also important. Learning is of fundamental importance for human being and other live creatures. All our routine activities (talking, understanding, reading, social relations etc.) are dependent upon receiving and storing information of our surrounding environment. Memory and learning enable us to create new learnt skills and behaviors. There is no human life without learning (Mafakheri and Motamedi, 2011, 100).

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).

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).

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 metacognitive 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.

2. Theoretical framework

The life of any live creature, namely human being is dependent upon learning as any moment in life requires specific behavior without which progress is impossible and he should learn this behavior or change his previous behavior. The role of learning is obvious in all life aspects. Learning is not only learning specific skill or text books but also it affects the emotional growth, personality development and social interaction of human being. Man learns what to fear, what to live and how to behave in any place. Indeed, human being is involved in learning process at birth and this ability leads to progress and his difference from previous generation people. Learning is the basis of any progress in people and he can control the environment and most of the behaviors are based on learning. This is the reason why learning is one of the most important psychology fields. Without principles, nature, conditions and main features of learning, perceiving human behavior is very difficult. The present study attempted to investigate the principles, conditions, features and other learning aspects. As it was said, better identification of learning leads to reasonable perception of human being behaviors (Kazempour, 2012).

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 Hergenhan (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.

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).

3. 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).

4. 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 Khorasgan. 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 eight levels 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 combined cognitive and metacognitive strategies leads to better performance of learning educational media course.

2- The students who learnt the strategies combined had better performance in learning educational media compared to the students who learnt the strategies separately.

5. 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 combined cognitive and metacognitive strategies on learning of students in teacher training center of Shahid Rajayi of Qazvin. 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 Shahid Rajayi 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 (correlated t and variance analysis).
6. Study results

Hypothesis 1: Teaching combined cognitive and metacognitive 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 combined cognitive and metacognitive strategies subjects, 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 combined group

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>Number of n</th>
<th>Mean</th>
<th>Standard mean error</th>
<th>Degree of freedom</th>
<th>t</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>15</td>
<td>12.33</td>
<td>0.95</td>
<td>14</td>
<td>11.43</td>
<td>0.000</td>
</tr>
<tr>
<td>Post-test</td>
<td>15</td>
<td>21.13</td>
<td>0.90</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Based on the results in Table 1, the calculated t is 11.43 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 significant greater than 0.01.

Second hypothesis: Teaching cognitive and metacognitive strategies as combined had more influence on students' performance in learning educational media course compared to teaching two other strategies.

One-way variance analysis test was used to compare the difference of the pre-test and post-test means of three subjects group (Table 2). To determine the difference of the mean of each group with the mean of the other group, Tukey test (Table 3) was applied.

Table 2- The result of one-way variance analysis in medical media course

<table>
<thead>
<tr>
<th>Statistical indices</th>
<th>Variance</th>
<th>Sum of squares</th>
<th>Degree of freedom</th>
<th>Mean of squares</th>
<th>F value</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inter-groups</td>
<td></td>
<td>294.17</td>
<td>2</td>
<td>147.08</td>
<td>11.44</td>
<td>0.000</td>
</tr>
<tr>
<td>Intra-groups</td>
<td></td>
<td>539.60</td>
<td>42</td>
<td>12.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>833.77</td>
<td>44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in the table (2), F is 11.44 and total degree of freedom is 44 and the significance level is 0.000. It can be said that there is a significant difference between the mean of squares of three groups at level 0.01.

The results of Tukey test in Table 3 show that there is no significant difference between the means of metacognitive and cognitive groups at the level 0.05 but there is a significant difference between the means of cognitive group and combined group and metacognitive group and combined group at the level 0.05.

Table 3- The result of Tukey test in educational media course

<table>
<thead>
<tr>
<th>Groups</th>
<th>Means difference</th>
<th>Standard deviation error</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metacognition</td>
<td>2.33</td>
<td>1.30</td>
<td>0.18</td>
</tr>
<tr>
<td>Cognition</td>
<td>-3.86</td>
<td>1.30</td>
<td>0.01</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognition</td>
<td>-2.33</td>
<td>1.30</td>
<td>0.18</td>
</tr>
<tr>
<td>Metacognition</td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>Combined</td>
<td>-6.20</td>
<td>1.30</td>
<td></td>
</tr>
<tr>
<td>Cognition</td>
<td>3.86</td>
<td>1.30</td>
<td>0.01</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacognition</td>
<td>6.20</td>
<td>1.30</td>
<td>0.000</td>
</tr>
</tbody>
</table>

7. Discussion and Conclusion
First hypothesis: Teaching combined cognitive strategies leads to better performance of students in learning educational media course.

As it was said, correlated-t test was used for the comparison of the difference between the mean pre-test and post-test scores of educational media in experiment group learning combined cognitive and metacognitive strategies. T-value and degree of freedom were 11.43 and 14, respectively.

Based on the above result, the difference between the mean pre-test and post-test scores in educational media course was significant at greater than 0.01 level. Thus, null hypothesis is rejected and the study hypothesis is supported. It can be said that teaching combined cognitive and metacognitive strategies leads to the improvement of students’ performance in learning educational media course.

Fazeli (2006) in a study found similar results and believed that teaching combined cognitive and metacognitive strategies increases and improves the students’ performance in learning computer and internet basics.

The results of the study of Palisnkar and Brown (1985, cited in Seif, 2000) in a study investigated the effect of teaching cognitive and metacognitive skills on improving the quality of reading and comprehension of the students of the first of high school and they were consistent with the results of this study. They showed that teaching cognitive and metacognitive strategies increases both learning and transferring learning of the students.

Second hypothesis: Teaching combined cognitive and metacognitive strategies had more influence on students’ performance in learning educational media compared to teaching two other strategies.

This hypothesis compared the performance of three subject groups in educational media and to compared the difference of the means pre-test and post-test of three groups, one-way variance analysis was used. Tukey test was used to determine the difference between the performance of groups and the difference between the mean of each group with the mean of another group.

F value is 11.44 in one-way variance analysis of educational media course. It can be said that f value was significant at level 0.05 in educational media course and Tukey test in educational media showed that there was no significant difference between the performance of the group (cognitive and metacognitive), but there was a significant difference between the performance of cognitive and combined group and metacognitive and combined group.

It can be said that the group who underwent combined cognitive and metacognitive strategies teaching showed better performance compared to the other groups. Thus, the hypothesis is supported and null hypothesis is rejected. It can be said that this strategy had more effect on learning educational media course compared to other strategies.

The results of the following researches support the results of the present study and they are consistent with the present study.

Fazeli (2006) in a study found that the students learning the strategies as combined had better performance in learning computer and internet basics compared to the students who learnt the strategies separately.

Vahedi (1997) conducted a study and stated that the amount of using learning strategies (cognitive and metacognitive) had positive effect on academic achievement of the students.

Ostovar (2001) stated that teaching combined cognitive and metacognitive strategies had more influence on students’ performance in sciences assignment.

8. 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.

References


Hoy, w.k. and Miskel, C.G (2005) Educational admistration (Thory, research andpractice), newyork, Randomhous.


