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Original Article

The Effect of Teaching Metacognition Strategies on Time Management

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ABSTRACT

The aim of this research was to investigate the effect of teaching metacognition strategies on time management among the undergraduate students in Takab University of Applied Science and Technology. The research proposal was experimental with pre-test and post-test design with control group. The population consisted of sixty students who were selected randomly by stratified sampling and replaced in two groups of experimental and control. In collecting the data about time management, we used Queen and Associate's time management questionnaire (1990) that was performed in pretest and posttest forms for the two groups. Having carried out the pretest, the experimental group received metacognition strategies training. While the control group did not receive any metacognition strategies training, the experimental group received nine sessions of 70 minutes duration. After completing teaching metacognition strategies to the experimental group and not teaching these strategies to the control group, the Queen and Associates questionnaire was carried out for the two groups. Then the scores received from the two groups were analysed by using covariance analysis. Research findings indicated that teaching metacognition strategies bears positive effects on the students' time management.
Key words: Cognition, Metacognition, Metacognition Strategies, Time Management.

INTRODUCTION

Unlike the previous times in which it was thought that someone's ability to learn depended on his or her IQ and talents, in the recent years a theory has been strengthened among psychologists that holds important some other Non-intrinsic factors in spite of the determining role of the intrinsic factor like intelligence and talent in learning. One of these is learning strategies or in more technical terms the cognitive and metacognitive strategies which during the recent years the educational psychology has progressed significantly in discovering these strategies.

According to the definition, the cognitive strategies are the learner's each behavior, action or thought that he or she uses while learning and is aimed at contributing to learning, organizing and saving the knowledge and skills and facilitating their utilization in the future [1]. These strategies contribute to creating and increasing knowledge and cognitive processes. These strategies include several strategies that Weinstein et al. believe that it includes remembering, elaboration and organization [2]. These strategies are in relation with the educational performance [3].

The remembering strategies include sentence recitation for learning, speaking aloud while reading a text, highlighting and underlying the important matters by using a relatively active method rather than a surface learning one. It is assumed that the remembering strategies help the students to concentrate their attention and extract the important data from the lists or tests and actively place this data in the performance memory. Despite this, the mentioned strategies don't indicate much deep processing levels.

The elaborating strategies include explaining, interpreting and summarizing the data for learning, extrapolating, creative note taking and answering [2]. These strategies show a deeper learning level and necessitate that the learner should go beyond the studied text and make the related inferences about it.

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Another kind of deep processing strategies is organization that include behaviors such as selecting the main idea of the text, lining, highlighting the text for learning, using various skills for selecting and organizing the ideas present in the assignment, designing and preparing a network or a plan of important ideas, identifying the prose structures or explaining and interpreting the text. The organization strategies result in a deeper understanding of the reading materials and most of successful and professional learners use these strategies to a great extent.

Metacognition is a term which was used by Flavel [4] in order to describe one's knowledge about the cognitive processes or the products or anything related to them. Flavel [4] believed that metacognition includes monitoring and active learning regulation and information processing activities [5]. To provide a more concise formula, defined metacognition as this: "metacognition indicates the personal knowledge, information and learning control." Thus, metacognition development can be defined as development in metacognitive abilities i.e. moving toward more knowledge, self-awareness and personal learning control. In other word, the term metacognition refers to our knowledge about our cognitive processes and to the way in which we optimize them to achieve the learning objectives [6].

In fact, metacognitive strategies emphasize on the student's skill in planning, monitoring and regulating their learning in many fields [6]. The objective of these strategies is to enhance the students' self-regulation by motivating them to self-assessment [7]. Planning includes tactics like goals setting, pre reading review and asking and answering [8]. Monitoring is a process in which a learner controls his or her understanding of knowledge and skills [2].

Monitoring aimed at learning improvement helps the students to concentrate their attentions and differentiate between the effective and ineffective performance. Similarly, this strategy improves the time management [9]. In fact, it assesses, monitors the assignment fulfilling method and directs within the learner's controlling and monitoring strategy of his or her own performance to be informed of his or her progress, out of these strategies, monitoring one's attention while reading a text, self-questioning while reading, time control, and study speed could be mentioned. These strategies provide the learner with a good feedback from his or her own performance while reading and its outcome and due to these feedbacks the learner corrects and regulates his performance in terms of speed and method for obtaining a better result. Regulation strategies bear flexibility in the learner's behavior and help him or her to change his or her style of learning whenever necessary [3]. Researchers showed that teaching the cognitive and metacognitive strategies enhances and improves the learning and learner's educational improvement [10]. He points out that the students who had received the cognitive and metacognitive skills teaching were more successful compared to the student had not received these learning strategies in terms of reading and comprehension abilities.

On the other hand, one of the important aspects of students' learning is the effective use of time. Time management includes designing, planning and studying duration control. In fact, self-regulation of the studying environment components and time indicates the student's effective use of time and the surrounding environment for the successful performance of goals [11]. One of the most important complaints of students is the lack of time for doing all their homework [12]. The research showed that teaching the metacognitive strategies contributes to the improvement in self-regulation of time use and therefore improves the students' performance result [9].

Various researches have been carried out regarding the metacognitive skills and strategies:

Weinstein et al. [1] pointed out in their studies that teacher can help the students by teaching cognitive and metacognitive strategies so as to become more successful learners and play a more active role in their education destiny. Caraway et al. [13] study the five and six grader students' ability to solve a problem after carrying out three assignments. He specified in his study that providing special education as well as metacognitive strategies (monitoring and control) to the tested groups has enabled them to solve more complex problems and faster problem solving compared to the control group.

In one of his studies titled as the role of metacognition in teaching and learning, Anderson [14] came to the conclusion that teaching metacognitive skills has a valuable role in teaching a second language to teachers. Scot et al. [quoted from 15] thought cognitive and metacognitive skills to the 3 and 5 graders, the result of this study showed that the students who had received teaching these kinds of skills (the experiment group) compared to the students who did not receive teaching these skills (the control group) were more able in reading and comprehension. In addition, compared to the students in the control group, the students in the experiment group obtained more information about using cognitive and metacognitive strategies and their benefits. Brown [10] showed that not only the children with mild mental retardation but also the students with learning disabilities suffer cognitive dysfunctions compared to the ordinary students. By teaching the necessary skills to this kind of students, these researchers could take away the defects in the students' learning methods. Also in another research, the mentioned researchers showed that teaching the appropriate study methods (e.g. paraphrasing the main ideas of the reading materials, data classification, predicting the questions which might be asked about the reading material, clarifying the important points and the way of solving the problems) to high school students will increase their learning and learning transfer.

In one of their researches over 120 freshman students in the US South Western State University, Caraway et al. [13] showed that there is a significant correlation between average education achievements, time management, concentration in studying (V) and learning strategies (r=0.27). In other words, the students who

had utilized the study strategies appropriately and had a good time regulation were more successful than those who had not behaved in the same manner. Generally, this research showed that study skills and the attitude of students toward the educational achievement have showed the greatest correlations with the educational activities in the academic course of students. Based on their findings, they suggested that such skills and their levels predict the educational success of students in their academic course better than the university entrance exam scores.

The results obtained from another study showed that by teaching the study strategies, the number of students' reading errors in different levels decreased while their comprehension scores in the reading test increases [16]. Another study showed that scores level of the students who utilized the learning strategies had an increase in the class quizzes from 57% to 71% [17].

In his study titles as the comparison of learning strategies between high school poor and clever students, Ababaf [18] concludes that there is a positive relationship between study strategies (cognitive and metacognitive) utilizing and optimal learning. The clever students utilize the strategies in their learning efficiently, but such skills utilization is not seen among the poor students.

In one research called developing assessment tools for learning and study strategies and finding the relationship between these strategies and high school students education achievement, Karami [19] concluded that 1- The clever students make more use of study and learning strategies compared to the poor students. 2- Utilizing the all strategies is correlated with educational achievement. 3-By using the scores obtained from learning and study strategies, the educational achievement can be predicted by means of regression equation and in this case, knowledge and self-control has the greatest capability in the educational achievement.

In one research titled as the effect of teaching cognitive and metacognitive strategies on the students' math problem solving performance, Bashavard [20] emphasized on the effect of teaching cognitive and metacognitive strategies on these students' math problem solving performance. In addition, no significant different were seen between the boys and girls performance in problem solving in this project. Motavaly [21] concluded that teaching cognitive and metacognitive strategies is correlated with reading ability, comprehension and learning speed. Ibrahimi Ghavamabadi [22] concluded that, in addition to comprehension and learning speed, teaching learning strategies is positively correlated with individuals' positive self-image, planning and problem solving. Furthermore, Avansian [23], showed that teaching metacognitive strategies is correlated with bilingual students' comprehension and learning speed.

According to what was mentioned above, the main objective of this research is to determine the effect of teaching metacognition strategies on college students' time management. Based on this, the effectiveness of the provided metacognitive program is determined.

So, according to the presented contents and theoretical discussions in this research, this hypothesis is put forward that: Teaching metacognition strategies has an effect on increasing time management skills.

MATERIALS AND METHODS

Statistical population and sampling: The population in this project includes all girl and boy students who majored in two fields of computer and accountancy in Takab University of Applied Science and Technology during the educational year 1388-1389. The age range of students was from 20 to 35 years old. For sampling and subject selection, the students' list was set; the number of student was 180 who majored in two fields of computer and accountancy. The ratio of computer students and accountancy student was equal. According to valid researches, out of this number, 60 subjects were selected by stratified random sampling. Since the ratio of both groups in the population was 50%, and in order that the ratio of both groups became 50% in the sampling as well, 30 accountancy students and 30 computer students were selected and the both groups of students were aligned in terms of demographic variables.

Research tools:

In collecting the data about time management, we used Queen and Associate's time management questionnaire. This questionnaire was prepared by Queen and Associate to measure the level of individuals' time management skills. The validity of this test was calculated 0.073. The face validity of the questionnaire was confirmed by the related experts. This questionnaire includes 20 questions and the scoring method is as follows: For the number of Yes answers for the statements 2,3,5,7,8,12 one point and for the number of No answers for the statements 1,4,9,10,11 one point is recorded and finally their total number and total point is summed up. The more the total points are they indicate that the individual's behavior is more near to the time management lines.

The metacognitive strategies teaching program is another tool used in the research. The objective of this program is to develop the students' conscious control over one's cognitive processes so that the learner could design, direct, monitor, evaluate and if necessary correct his or her own learning and cognitive activities.

Conditions and Process of doing the study:

We carried out the project in this way: After carrying out the pretest, the experimental group received metacognitive strategies training. While the control group did not receive any metacognition strategies training,

the experimental group received nine sessions of 70 minutes duration. After completing teaching metacognition strategies to the experimental group and not teaching these strategies to the control group, the Queen and Associates questionnaire was carried out for the two groups. Table number 1 shows the stages and steps in carrying out the metacognition strategies program.

Research Proposal:

The proposal used in this project was of pretest and posttest kind with the control group. Data analysis method: In addition to descriptive statistics, to analyze the data in this research, we used inferential statistics like covariance analysis. Also for analyzing the collected data, the software SPSS was used.

Table 1. Stages and patterns in metacognition strategies

Session 1	1-Acquaintance between learner and teacher
	2-Carrying out time management test as the pretest.
	3-Speaking about time management, its reasons and the strategies to use it
	4- Speaking about the goal of teaching
	5-Speaking about students' learning problems
Session 2	1-The definition of planning from teacher's point of view
	2-The definition of planning from learners' point of view
	3-Explaining about planning, its objectives, the factors affecting it and the obstacles ahead of it.
	4-The students were asked to plan for one of their own exams.
Session 3	1- Evaluating the students' planning
	2-Telling the Strengths and weaknesses of planning
	3-Pointing out tips such as study hours, goal, predicting unexpected events.
Session 4	1-Asking students' explanation about their study methods
	2-Explaining about the study objective.
	3-Explaining about successful students' method of study
Session 5	1-Explaining about how to monitor studying
	2-Explaining about study methods such as reviewing, note taking, expansion repeating
Session 6	1-Explaining about study methods and the need to self-review while studying
	2-Changing the study method, paying attention to concentration, the coordination between study speed and time, the hardness and easiness of the subject and…
Session 7	1-Emphasizing the importance of study review and control.
	2- Presenting the subject by the teacher himself
	3-Checking out one's thoughts while handling the problem by the teacher himself
	4-Checking out the solution, study time
	5-Presenting a problem to the learners and checking it out
Session 8	1-Summing up the subjects presented during the course
	2-Expressing the questions and problems about the learning subjects by students and teacher
	3-Tips about the role of programming in advancement, getting informed of study methods
Session 9	1- Carrying out time management test as pretest
	2-expressing gratitude to student for their participation

RESULTS

In this section the collected data have been analyzed by using different statistical methods and the results are presented in different tables. The results obtained from carrying out the pretest and posttest in the control and experiment groups are presented in table number 1.

Table 2. Data obtained from carrying out time management pretest and posttest from the control end experiment groups

Item	Minimum	Maximum	Mean Standard Error	Variance	Standard Deviation	Mean
Experiment Group Pretest	6	10	0.2286	1.5678	1.2521	8.133
Control Group Pretest	3	11	0.3231	3.13	1.76	7.2
Experiment Group Post Test	6	12	0.3313	3.29	1.81	9.53
Control Group Post Test	6	12	.2812	2.37	1.54	8.8

After the results have been extracted, the experiment group's Mean and standard deviation on the scale of time management in the pretest was calculated. The results are presented in table number 2.

Table 3. The experiment group's Mean and standard deviation on the scale of time management in the pretest

Item	Minimum	Maximum	Standard deviation	Mean
Pretest	6	10	1.2521	8.133

As it is presented in the table, the mean and standard deviation of the experiment group in the pretest are 8.13 and 1.25 respectively. The control group's mean and standard deviation on the scale of time management before the test is shown in the table number 3.

Table 4. Control group's mean and standard deviation on the scale of time management before the test

Item	Minimum	Maximum	Standard deviation	Mean
Pretest	3	11	1.76	7.2

As it is seen in the table above, the control group mean and standard deviation on the scale of time management in the pretest are 7.2 and 1.76 respectively. The experiment group's mean and standard deviation on the scale of time management in the post test is shown in the table number 4 and the same subject is presented for the control group in the table 5.

Table 5. Experiment group's mean and standard deviation on the scale of time management in the post test

Item	Minimum	Maximum	Standard deviation	Mean
Post test	6	12	1.81	9.53

Table 6. Control group's mean and standard deviation on the scale of time management in the post test

Yi=a0+B3Xi+ ε		Yi=Corr(ΔDAP, ΔPDI)	
p-value	0.00	Durban, Watson statistic	1.97
t-statistic	-12.7	Effectiveness(B2 coefficient)	-1.04
Correlation confident(R)	0.35	f-statistic	161
Determination coefficient(R^2)	0.34	Standard deviation	0.003
The range of dependent variables (EYi)	0.84		

As it is seen in the tables above, the experiment group mean and standard deviation on the scale of time management in the posttest are 9.53 and 1.81respectively and the same case for the control group on the scale of time management in the post test is 8.8 and 1.54 respectively. In this project, mean and standard deviation of time management scores of the control and experiment groups were calculated before and after the teaching. The results are shown on the table 6.

Table7. A descriptive table of time management before and after the test

Group	Scale	T2 (time management score after the teaching)	T1 (time management score before the teaching)
Control	Mean	8.8	7.2
	Standard deviation	1.54	1.76
Experiment	Mean	9.53	8.13
	Standard deviation	1.81	1.25

According to the table number 6, it can be seen that the mean time management score before the learning course in the control group is 7.2 with the standard deviation of 1.76. The mean management score after the course is 8.8 with the standard deviation of 1.54, and in the experiment group, the mean time management score before the learning course is 8.13 with the standard deviation of 1.25, the mean time management score after the learning course is 9.53 with the standard deviation of 1.81. A survey into project's hypothesis: Learning metacognition strategies increases time management skills.

Table 8. A descriptive table for experiment and control group

Item	Significance	Levine's F test	N	Standard deviation	mean
Experiment	0.076	3.26	30	1.81	9.5
Control			30	1.54	8.8

Table 9. ANOVA

Item	Significance	F	Mean Squares	Degree of Freedom	Sum of Squares
Variable	0.001	12.864	13.59	1	13.593
T1(between group)	0.001	98.64	104.038	1	104.03
Within group (error)			1.057	58	60.229
Total				59	172.33

According to the table number 7, it is seen that the experiment groups mean score on the scale of time management is 9.5 with the standard deviation of 1.81.And the control group's mean score on the scale of time management is 8.8 with the standard deviation of 1.54. According to the table number 8, since the significance level of Levine's F test is 0.076 and is bigger than 0.5, it can be concluded that variances are homogeneous. Considering the table number 8, it is seen that the significance level of variable F is smaller than 0.05 so that it indicates that the variable (pretest) is a determining factor that we removed its effect by ANOVA. Regarding F significance level (T1 between groups) it can be noticed that the significance level is less than 0.05 which indicates the effect of metacognition strategies learning by removing the effect of pretest. So we conclude that learning metacognition strategies increases time management skills while study.

DISCUSSION

As the findings of study indicate, teaching metacognition strategies to the students in the University of Applied Science and Technology improves their time management and has a positive effect on them. Nelson [quoted from 24] holds that metacognition is one of the one hundred research titles that have been studied in the psychological and evolutionary field during the recent years. The role of metacognition has been studied in various fields such as learning, memory, thinking and problem solving.

Pintrich [11] acknowledges that cognitive regulation and utilizing metacognitive strategies can affect the effectiveness of learning and result in students' educational achievement and advancement; he showed that self-regulated learning can be facilitated by adopting subtle goals about assignments; moreover, it may be inhibited by adopting unnecessary and useless goals. Zimmerman [9] taught cognitive and metacognitive skills to the third and fifth grade students. The results obtained from this research showed that the students who had been taught this kind of skills (the experiment group) were more able to read and understand compared to the students who did receive such instructions (the control group). In addition, the students in the experiment group had become more aware of using cognitive and metacognitive strategies and their advantages compared to the students in the control group. Weinstein et al. [quoted from 15] mention some researches with the following results that teachers can help the students by teaching cognitive and metacognitive skills to them so that they become successful learners and play a more active role in their educational destiny. The pedagogical researches carried out about metacognition improvement showed that the students aware of this matter are motivated to correct or modify their thinking about scientific concepts and successful problem solving; moreover teaching these strategies to the students takes them to a stage that they become skillful learners.

In addition, according to the self-regulation learning models, one of the strategies that pave the way for this kind of learning is time management and learning environment and studying, as Pintrich [11] asserts that the self-regulating learners utilize management strategies and a different control like time control management, effort and their learning environment for controlling environment and recourses. Therefore, before teaching metacognition strategies, during interviews with the students it was concluded that most of students had problems in time allocation over educational activities and time management that following the mentioned strategies and students' awareness of strategies for their programming, monitoring and regulation acknowledged that this problem was reduced significantly.

Generally, this study showed that utilizing the metacognition strategies is effective in students' achievement and enhances their learning. This result is in consistent with the foreign research results such as Weinstein et al. [2], Motavaly [21] and Garner [24]. According to the results obtained from short term metacognition strategies teaching to the learners it is distinguished that the thinking skills are capable of being learned or taught, therefore during the teaching course, teachers and university professors can primarily make efforts toward their own learning and then the students' learning, So that they can significantly affect the learners advancement. Similarly, according to the findings, the professors and teachers can pay more attention to the learners' study method and increasing their skills in learning rather than concentrating on the learning volume of the learners. Learners can develop their learning and time management skills by learning metacognition strategies and obtain knowledge and in this way become active learners.

In fact, by regulating individuals' mind and kind of studying, the above mentioned strategies enables the individuals to master over the process of their learning and study method and program for it seems that practicing these skills will improve time management and learning. High school or university students, who utilize the metacognitive strategies, try simultaneously to learn the subjects while the teacher is teaching or at the time of studying by giving meaning to the information, creating logical connection with the previous information,

controlling the process circumstances and creating an appropriate learning environment. The results indicate that high school or university students who utilize the metacognitive strategies show more persistent in fulfilling their assignments [11].

Therefore, teachers and university professors can help their students by teaching learning and study skills to them and make sure that the result of this learning will be very hopeful and many learning and transfer problems will be removed. In fact by teaching these skills, the process of teaching and learning becomes perfect, the ineffective methods will be recognized; the effective strategies are learned and utilized. Generally, by teaching metacognition strategies a better and more basic understanding is achieved so it can improve the time management skill and save study time.

In addition, this method is applicable for all the educational levels and it isnecessary to be recommended for different subjects.

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