The effectiveness of self-regulation learning skills on motivational and academic variables among students

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Abstract

The purpose of this study was to determine the effectiveness of self-regulating learning strategies on motivation, self-efficacy and academic performance of fifth grade female students in science lessons. For this purpose, two classes were selected as cluster random sampling. One of the classes was selected as the experimental group;, they were provided with a self-regulation training program in 12 sessions of 1 hour, and the control group did not receive the program. The research method was experimental and its design was quasi-experimental, pre-test and post-test. To measure the variables the Harter's Educational Motivation Questionnaire (1981) and the academic self-efficacy questionnaire (Mcilroy & Bunting (2001)) were used. Students' results of sciences midterm examination and the researcher's self-structured four-choice test were used to assess the academic achievement. The questionnaires were provided to the students before and after the training. One-factor covariance analysis was used to analyze the data. The results of the study showed that self-regulating learning strategies have a significant effect on students' motivation and academic self-efficacy (p <0.05). The academic performance of students in the sciences increased significantly.

Key words: self-regulation learning strategies training, academic motivation,
academic self-efficacy, academic performance

Preface

Academic motivation is considered as energy factor for students to do homework, and interest them in the pursuit of learning. (Artino & Stephens, 2009). This concept reflects the difference for efforts to do homework, which is why it is always judged as an important factor in education (Bohrani, 2009). For example, Pintrich and De Groot's (2010) research suggests that students with high academic motivation, in comparison with other students, have better academic scores and higher educational success. Mahmoudi et al. (2014) research also shows a meaningful relationship between self-regulation learning skills and motivation. In general, motivational theories accepted that academic motivation positively affects students' performance (Ryan & Deci, 2000). Effective strategies should be developed to increase students' motivation, considering that motivation is the most important condition for learning (Kadivar, 2016). One of these strategies is training of self-regulation learning strategies.

Berger and Karabenick (2010) point out in their research that there is a relationship between motivation and student's use of learning strategies.

According to Bandura (1993), these effects are typically because students, who are internally stimulated, are involved in activities that increase learning. One of the important motivational factors associated with self-regulation strategies is self-efficacy (Cleary & Zimmerman, 2004). Individuals with high levels of self-efficacy are hardworking, and more persistent in solving cognitive problems, display more insistence, and use problem-solving strategies (Pajares, 2000). AL-Baddareen et al. (2015) also found that metacognitive skills significantly

influenced academic motivation. Based on the findings of Guryay (2016), students with self-regulating skills were motivated academically and showed better learning quality.

Aksan (2009) also found in his research that weakness in self-regulation skills leads to low motivation and reduced learning. These skills help students to choose suitable learning strategies for their goals and use in the work process. Therefore, students need to know how they must learn and how to realize learning.Pintrich (1990) has a comprehensive definition of self-regulation learning. He sees this kind of learning as an active and organized process in which learners choose goals for their learning and then try to regulate, control and monitor their cognition, motivation and behavior. Zimmerman (2001) sees self-regulation learning as a pragmatic process by which learners turn their mental abilities into practical tasks related to assignments, which makes learning an activity that students do in an active way.

Findings of the research over the last few years in the field of self-regulation (for example, Fonteyne et al. research (2017), Ning & Downing (2010), Berger & Karabenick (2010); Perry et al. (2008); Liew & Mctigue (2008); Breuer & Eugster (2006); Cleary & Zimmerman (2004); Pintrich & Schunk (2002)) show that successful and self-regulated students have characteristics such as intrinsic motivation and self-efficacy beliefs. They use cognitive and metacognitive strategies more, they are confident in their ability, and use more resources to achieve their goals and show better performance.

Self-regulation learning strategies are necessary tools for students' success and have a close relationship with self-efficacy and academic achievement. According to Tavakoli Zadeh et al. research (2015), metacognitive skills can be a good predictor of self-efficacy.

The results of Mohammad Amini's findings (2008) showed that there is a significant relationship between self-regulation learning strategies and academic achievement, and all components of self-regulation learning have the ability to predict academic achievement.

In addition, a significant number of studies have shown that the training of self-regulation learning strategies can enhance academic achievement and facilitate learning motivation. For example, Dignath et al. (2008) have quoted the research in which Scott Paris and colleagues taught students in 3rd and 5th grades in 1984 and 1986, cognitive and metacognitive skills. The results of these studies have shown that students who were trained in such skills were more able to read and understand the content than those who did not have these skills. In addition, the students of the control group became more aware of how to use the cognitive and metacognitive strategies and their benefits (Seif, 2008).

In his research, Cleary (2017) studied the effects of the self-regulation empowerment program (SREP) on middle school students' strategic skills. The results showed

that the level of study skills, self-efficacy and academic achievement in the experimental group significantly increased.

The results of Smith et al. (2015) research on preschoolers in English lesson have shown the effect of self-regulation training on self-regulation improvement and student progress.

According to the results of Fonteyne et al. (2017), there is a relationship between student's use of self-regulation learning strategies and academic performance. Based on the findings of Turan and Demirel (2010) and Ifenthaler (2012), if self-regulation learning skills increase, therefore academic performance and self-efficacy increase.

Pour Mohammad and Ismail Pour (2015), who worked on the effect of self-regulation training on the academic achievement of students in the conservatory school, considered these trainings effective.

According to Ning and Downing (2010), student's self-regulation predicts their future motivation, and the cause of much of the lack of motivation is the lack of awareness of the appropriate strategies in various learning situations. Aksan (2009) also found in his research that weakness in self-regulation skills leads to low motivation and reduced learning.

Paris and Oka (1986) point out that students need to find a variety of useful strategies that are necessary for learning and success, and those who are responsible and motivated to learn these strategies will succeed. Self-regulation learning strategies are among the necessary tools for student success and have a close relationship with self-efficacy and academic achievement. Results from Christopher et al. (2017) showed that self-regulation learning and emotional skills have a significant effect on academic performance.

According to Bloom (1982), creation of conditions for success is a way of motivating. When students acquire skills and learning strategies, they realize that they have a lot of control over learning and success, and they can achieve success using it and consider themselves as self-efficacy learners (quoted by Abd Khoda'i, (2008).

Samadi (2008) has studied the immediate and continuous impact of self-regulation strategies training. His findings showed that self-regulation strategies are learnable and in the case of correct training, their effects are sustainable over time. The results of Liew and Mctigue's (2008) research on primary school students over three years supported the improvement of self-regulation skills of students in the early years, and stated that these trainings lead to self-efficacy beliefs and future academic achievement of students.

Research results of Perry et al. (2008) also indicated that reinforcement exercises and exercises that enhance self-regulation learning are effective on increasing the academic performance of primary school students. In a meta-analysis study, comparing the results of 48 studies on

the effect of self-regulation learning on primary students, showed that self-regulation training programmes have an impact on student success (Dignath et al., 2008).

Freeman (2017) also conducted research on students in grade 4, showing that fourth-year students have the ability to use metacognitive skills and use these skills in relationship to their academic achievement.

Guthrie et al. (2004) also conducted cognitive, metacognitive and motivational strategies through classroom teachers to enhance the motivation of grade 3 students and their advancement in science lessons. The results of this study showed a significant effect on students' motivation in science lessons. A longitudinal study of Mägi et al. (2016) on students in elementary grades showed that the growth of self-regulatory behavioral and cognitive aspects related to maths and reading skills.

According to these findings, self-regulation skills training is expected to play a role in increasing self-efficacy and consequently in the motivation and academic achievement of students. Public education of these skills require sufficient research support. Further research is needed in this field, considering the importance of teaching these strategies from elementary grades. The present study is important and necessary for the purpose of impact of self-regulation strategies training on motivation, self-efficacy and academic performance in fifth grade elementary students.

Reseach method

The present research was carried out using the experimental and pre-test, post-test, quasi-experimental design.

The statistical population of this study was all female students of the fifth grade elementary school in the sixth district of Tehran. The statistical sample of this study was selected from among the selected population through random cluster sampling, and assigned randomly to the experimental and control group. Pre-test was performed for both groups, then the self-regulation learning skills training program was implemented in 12 sessions of 1 hour for the experimental group and did not run for the control group. Two months after the end of the training sessions, in order to compare the effect of this intervention, both groups were post-tested, and the results of the pre-test and post-test were compared in both groups. The number of groups was 23. According to Cohen tables, in order to choose the size of the sample group for experimental designs with two groups, it was recommended about 24 people were needed for an effect size of 0.40 and a power of about 0.78.

Instruments

A: Scale of academic motivation: To measure academic motivation, we used the modified form of Harter's Educational Motivation Scale (1981) which was developed by Lepper et al. (2005). This scale is used to measure academic motivation at elementary school. This scale is one of the most famous scales that measures individual differences in the dimensions of both intrinsic and extrinsic motivation. Harter's scale consists of 18 questions, and each question measures the two intrinsic and extrinsic motivation poles at the ends of a continuum. Subsequently, Lepper et al. (2005) ignored the hypothesis of the dual polarity of the motivation, designed Harter's scale as separate questions for both intrinsic and extrinsic motivation dimensions, and implemented it with a 5-point Likert scale. Harter (1981) calculated the ratio of particle scales reliability using Richardson's formula 20 between 0.54 and 0.84, reported the coefficients of re-test in a sample during the 9-month period from 0.48 to 0.63 and in another sample for 5 months between 0.58 and 0.76. In Iran Bohrani (2009) verified this scale's translation, validity and reliability.

B: Academic self-efficacy scale: To measure academic self-efficacy, we used the scale proposed by Mcilroy and Bunting (2001). This scale consists of 10 articles, arranged in a 7-point Likert range from "I totally agree with ", to "I completely disagree". Mcilroy and Bunting (2001) reported Cronbach's alpha questionnaire at 0.81. Borjali Lou (2007) also reported goodness of fit index questionnaire 0.87 and the goodness of fit adjusted index 0.92, which can be indicative of the high validity of this scale. He reported the reliability of the scale at 0.63 through Cronbach's alpha.

C: Academic performance: Academic performance in this study was evaluated by two tests.
-The score of students in first and second semesters in science lessons.
-In order to ensure the results of the research and to increase the accuracy of the work, it designed two series of multi-choice tests from discussed topics of 5th grade science lesson by the researcher. A pre-training test and a post-training test were performed for both groups. The score that students received through responding to these quizzes were considered as academic achievement score. Three teachers of the fifth grade approved content validity of these tests.

Self-regulation learning strategies training programme based on Pintrich's self-regulation model (1999) was the independent variable in this study, which was presented to female students of fifth grade in 12 sessions of 1 hour. Strategies included cognitive, metacognition, resource management, and motivational strategies. The content of the training included First session: Communication. Session 2: Motivation. Session 3: Understanding the purpose of the study. Session 4: Recognition of the attention and focus strategy. Sessions 5 and 6: Planning. Seventh Session: Understanding repetition and review strategies. Eighth Session: Understanding the semantic expansion strategy. Session 9: Understanding the organization strategy. Session 10: Understanding SQ4R method for studying. Session 11: Understanding self-regulatory strategy (setting reading activity while studying lessons). Twelfth Session: Review of the past sessions.

The dependent variables in the present research were self-efficacy and academic performance in the science lessons of female 5th grade students in elementary school.

Data Analysis method

One-factor covariance analysis and SPSS software were used to study the research hypotheses to maintain or control the effect of pre-test.

Research Findings

First, descriptive information about the variables explained and then covariance analysis is expressed. It should be noted that the assumptions of covariance analysis, such as homogeneity of variances and homogeneity of regression slopes, were investigated and analyses have continued with respect to the provision of these assumptions.

In Table 1, are shown the descriptive findings of the experimental and control group in the pre-test and post-test stages for academic motivation and self-efficacy for a sample of 23 individuals in each group. As we can see, in the experimental group the mean of self-regulatory scores in comparison with the control group after the implementation of the training program increased.

The results in Table 1 show that: In the experimental group, there was a higher increase in the scores of motivation and academic self-efficacy compared to the control group.

The results of the implementation of covariance analysis and its assumptions in the scores of the academic motivation skills scale are presented in Table 2. As can be seen in this table, in the first hypothesis of the study the zero assumption is rejected in two groups (experiment and control) in the academic motivation scale, based on increases in students' academic motivation training by self-regulation learning strategies. In other words, at the level of $P < 0.05$, there is a significant difference between self-regulation learning strategies for increasing educational motivation in the experimental group compared to the control group.

This means that the first hypothesis of the research is confirmed. In other words, training of self-regulation learning strategies has increased student's academic motivation.

Regarding the second hypothesis, the training of self-regulation strategies increases student's academic self-efficacy, covariance analysis was used, the results of which are presented in Table 3.

The results of covariance analysis in Table 3 indicate that, in the self-efficacy scale, zero-assumption of the randomness in changes of post-test results compared to the results of the pre-test in self-regulation learning strategies was rejected. In other words, in the meaningful level of $P < 0.05$, there is a significant difference between experimental group compared to the control group in the

effect of training on self-regulation learning strategies to increase self-efficacy.

The results of covariance analysis in the table indicate that the effect of self-regulating learning strategies on increasing the academic self-efficacy of the experimental group compared to the control group was significantly different at the level of $P < 0.05$.

To investigate any of the research hypotheses one-factor covariance analysis was used because of the pre-test. First, the descriptive information about the variables is explained and then covariance analysis is expressed.

In Table 4, descriptive information about the semester score and the four-choice test of academic achievement for a sample of 23 individuals in each group is presented. The third hypothesis of research: Training of self-regulation strategies increases students' academic achievement in science.

The results of covariance analysis in Table 5 showed that at the level of $P < 0.05$, the semester score of academic achievement in the experimental group was significantly different from the control group.

The results of covariance analysis in Table 6 showed that at the level of $P < 0.05$, the effect of training on self-regulation learning strategies for four-choice test of academic achievement in the experimental group was significantly different from the control group.

Discussion and Conclusion

As previously stated, the purpose of this research is to study the effect of self-regulation learning strategies on increasing the motivation and academic self-efficacy of fifth grade students in elementary school. In order to achieve the research goals, we have tried to test the research hypotheses, which will be discussed and analyzed with the findings of the research in this section.

In the test of the first hypothesis of the study based on (self-regulation learning strategies training increases students' academic motivation), the research data and the results of the covariance analysis revealed that there was a significant difference between the mean scores of post test of the experimental and control groups. Students who received training of self-regulation learning strategies have higher levels of motivation and higher academic self-efficacy. This finding is consistent with the results of Ning and Downing (2010), Berger and Karabenick (2010), Guthrie et al. (2004), Mason (2004), Gholamali Lavasani et al (2008), Samadi (2008).

Regarding the assumption that self-regulation strategies training improves academic self-efficacy, the data of the present study showed a significant difference between the mean scores of post-test of experimental and control groups using covariance analysis. This means that training of self-regulatory learning strategies has been able to influence students' academic self-efficacy. This finding is

Table 1. Mean and standard deviation of motivation and academic self-efficacy of the groups in pre-test and post-test

Variable	The Semester Score of Science Lesson				Four- Choice Test of Science Lesson			
	Pre-test		Post-test		Pre-test		Post-test	
Groups	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Experimental	113.13	21.39	132.04	16.10	49.13	8.76	58.04	7.2
Control	114.04	25.59	117.26	19.37	50.35	8.84	51.09	8.41

Table 2: Significance difference in mean scores test of two groups in the academic motivation scale

Source of change	Sum of Squares	Degrees of Freedom	Average Squares	F	Significance Level	Power
Pre-test	5336.16	1	5336.16	25.49	0.001	0.999
Group	2659.01	1	2659.01	12.70	0.001	0.936
Error	9003.24	43	209.38			

Table 3. The test of significance difference between the mean scores of the two groups in academic self-efficacy

Source of change	Sum of Squares	Degrees of Freedom	Average Squares	F	Significance Level	Power
Pre-test	712.10	1	712.10	27.78	0.001	1.00
Group	452.95	1	452.95	17.67	0.001	0.98
Error	1102.33	43	25.64			
Sum.	31311.00	46				

Table 4. Mean and standard deviation of the semester score and four- choice test of the academic achievement of the groups in the pre-test and post-test

Variable	The Semester Score of Science Lesson				Four- Choice Test of Science Lesson			
	Pre-test		Post-test		Pre-test		Post-test	
Groups	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Experimental	18.00	4.82	19.16	1.34	26.52	5.03	28.91	4.43
Control	18.47	2.60	18.42	3.41	24.65	5.63	22.39	6.58

Table 5. The test of significance difference in the mean scores of the subjects in the control and experimental groups in the scale of the semester scores of academic achievement

Source of Change	Sum of Squares	Degrees of Freedom	Average Squares	F	Significance Level	Power
Pre-test	73.19	1	73.19	100.48	0.001	1.00
Group	12.54	1	12.54	17.21	0.001	0.98
Error	31.32	43	0.73			
Sum.	16357.75	46				

Table 6. The test of significance difference in mean scores of the subjects in the control and experimental groups in the four-choice test of academic achievement.

Source of change	Sum of squares	Degrees of freedom	Average squares	F	Significance level	Power
Pre-test	712.10	1	712.10	27.78	0.001	1.00
Group	452.95	1	452.95	17.67	0.001	0.98
Error	1102.33	43	25.64			
Sum.	31311.00	46				

consistent with the results of Cleary research (2017), Ning and Downing (2010), Liew & Mctigue (2008), Pintrich and Degroot (1990).

The findings of this study indicate that training of self-regulation learning strategies have a positive and significant effect on academic achievement of 5th elementary grade female students. Students who have received self-regulation learning strategies have higher academic achievement. This finding is consistent with the results of Christopher (2017), Mägi (2016), Dignath et al. (2008), and Zimmerman et al. (2005). In explaining the results of this study, it can be stated that self-regulating learners are active participants in the learning process. These students use a variety of learning strategies in pursuit of personal learning goals and continuously monitor their progress. Self-regulating learners will insist on their efforts to learn and change their own strategies if necessary to improve learning. These students begin the process of learning by choosing the goal. They choose the appropriate strategy and continuously control progress towards achieving those goals. Students who use more self-regulation strategies try to make information meaningful, make a logical connection with the previous information, control the process method and create an appropriate learning environment, learn the content, and improve academic performance while training or when studying. In other words, these students are aware of how they learn through meta-cognitive strategies (self-inquiry, self-monitoring, and self-assessment). They achieve significant academic achievement by trying to succeed, enjoying activity challenges, using appropriate learning strategies, setting special goals and showing a high level of self-efficacy. While for students who use less of these strategies, their learning is often rote learning, and only by repetition, and since this type of learning is short-lived, the lessons learned will be forgotten quickly in the absence of application. The self-regulation ability allows an individual to control and monitor his or her behaviors, to evaluate these behaviors, to measure them according to their own criteria, and to enforce and punish themself. A person, whose self-assessing is positive, recognizes themself as efficient and willingly does things. Because they believe, they can make more progress. On the other hand, someone who is not very satisfied with the results of their self-assessment, a level of self-efficacy and motivation will not necessarily be reduced to further efforts; of course, provided that they believe they have the ability to succeed, but the method that has been used so far has been false. Such students can change self-regulation processes through hard work, endurance, and other strategy choices, as well as getting help from teachers and friends. Once the student has acquired the ability of self-regulation, the more he or she organizes learning, the more successful they will be in doing their school work.

The successful application of these strategies leads to an increase in students' self-efficacy beliefs; therefore, student's motivational engagement increases in course learning. It can be stated that self-regulation of students predicts their self-efficacy and their future motivation.

Because the use of students from higher-level strategies as well as their attention on their own progress can lead to deeper learning and increasing self-efficacy beliefs and higher academic performance and will be effective in internalizing motivation and creating a learning style for students.

In general, according to the results of this study, it can be stated that the training programme of self-regulation strategies can have a significant effect on the increase of motivation and academic self-efficacy of fifth grade elementary students.

Finally, considering that these strategies are a general skill and required for learning in all the courses, and given the importance of teaching these skills, especially in the elementary years of study, it is suggested that in-service teacher training, introduces them with self-regulation learning strategies. Moreover, providing the field for teaching these skills in schools, because, according to Gardner's (1990) findings, learners do not use self-regulation strategies themselves unless they are taught and made to use these strategies.

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