The Effects of Motivated Strategies for Learning Questionnaire (MSLQ) on Students’ Cognitive and Meta-Cognitive Skills

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ABSTRACT
The aim of the present research is to identify the effect of teaching motivated strategies for learning on students’ cognitive and metacognitive skills. This research is a semi-experimental study with pre-test and post-test procedures. 46 students who obtained less than 162.5 scores in motivated strategies for learning questionnaire (MSLQ) are selected in statistically matched experimental and monitored groups of the study (each groups constitute of 23 students). The experimental group is administered in eight 100 minutes long sessions under the motivated strategies of learning protocol (MSL). This protocol is the adaptation of a theoretical background, utilized in previous studies. The results of the study indicate that after utilization of MSL, students’ cognitive and meta-cognitive skills are enhanced. Therefore, MSLQ is propounded as a learning facilitator.

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Key Words: Motivated Strategies for Learning Questionnaire (MSLQ), Learning Strategies, Strategy, Cognitive, Meta-Cognitive.

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Introduction
Motivation is a factor that causes a person to advance in his path towards a specific objective. Therefore, motivation is the generating force of behavioral characteristics and their objectives (Direh and Banijamali, 2008).

Motivated strategies are a determining factor in educational advancement. Numerous studies in educational psychology and learning indicate that motivation is in direct correlation with institutional learning, since learning is an active skill that requires conscious and purposeful endeavor. If an intelligent student does not acquire sufficient attention and appropriate level of conscious endeavor, he could not be successful in learning skills. In order to make educational curriculums beneficial, it is proper in a classroom to create a motivated and active background for students (Pintrich et al., 1991).

Students with efficient levels of learning skills and educational advancement acquire excellent grades and spend more time for doing their homework. Motivational problems retrench learners’ capacities and talents, resulting in their regressive failure (Stipekep, 2002). Through utilization of Pintrich’s theoretical model (1991), efficient variables of MSL on educational advancement are recognized, which consist of three sub-categories:
A) Self-efficacy: It is manifested in students’ beliefs about their performance skills.

B) Objective Orientation: It is manifested in students’ emphasis on a specific kind of homework or an educational course.

C) Examination Anxiety: It is manifested in the nefarious excitement of evaluative occasions (Mohammad Amini, 2009).

Psychologists and educationalists have long focused on studying the effect of motivational factors on the learning and performance of students in various fields of study. Much of early research has distinguished motivational and cognitive factors. Since at least the 1980’s, research has focused on how motivational and cognitive factors that together affect students' learning and progress interact. There is now consensus that in order to be successful in an institution, students require cognitive skills and motivational tendencies (Babaei Menghari, 2014).

In recent researches, the effects of motivated strategies on learning strategies are studied. Various classifications have been proposed for learning strategies, one of which is its categorization into cognitive and metacognitive strategies. Cognitive strategies are used to learn content and information in a text and metacognitive strategies are applied to monitor cognitive strategies (Royanto, 2012, cited in Mesrabad and Erfani Adaab, 2014 Karimzadeh et al., 2010) Motivated strategies are a series of methodologies and plans for educational problem solutions, resulting in academic data analysis. Learners require disciplinary principles in categorizing external stimuli, scientific and creative activities. Therefore, utilization of motivated strategies becomes imminent for efficient learners (Ababaf, 2009). These strategies can be materialized for simplistic, memorizing, complicated and comprehensive homework (Mohammad Amini, 2009). Montague (2000) considers six motivated strategies: Loud enunciation of the educational problem, proper problem analysis, simplistic visualization of the problem, aggregation and subtraction, speculation and recapitulation of problem (Ashoori et al., 2012).

New findings in educational psychology, cognitive psychology and education provide remarkable opportunities in education of cognitive skills so that learners can accomplish higher levels of learning and education. One of the most important advancements of the twentieth century is emergence of theories that emphasize on efficient cognitive skills and strategies. These efficient cognitive skills are regarded as metacognitive strategies, which are first suggested by Fluvial in 1979 (Garner, 1990; Branford et al.1986 cited in Kareshki, 2002).

Meta-cognition includes individual understanding from cognitive strategies and skills. In other words, it is any kind of activity, whose objective is acquisition of cognitive skills. Meta-cognition includes intelligent monitoring skills, attentive programming strategies, brainstorming kills, comprehension principles and their proper utilization. With a little bit of intelligent reflection, it is deducible that meta-cognition directs learners’ learning and deductive skills in his problem-solving procedures (Jazayeri and Esmaiili, 2002).


Roberts (2001) believes that some students study deeply and attentively so that they can acquire educational skills and competence. These students utilize efficient meta-cognitive strategies due to their strong internal motivation. Some of the efficient meta-cognitive skills are efficient organization and elaboration Driscoll, 2000 and Pinteridge, 2003). If students possess necessary motivational skills and knowledge to utilize self-regulatory learning strategies, it will affect their internal motivation, metacognitive and behavioral activities as well as their learning (Chralot et al. 2008 cited in Narimani, Mohammad Amini, Zahed and Abolghasemi, 2015). This is in line with findings of many previous studies (Khoddami et al, 2011; Malekian et al, 2012; Javanmard et al, 2012) that have found a significant relationship between metacognitive strategies and students’ motivation (Pourrerahein, Khosravi and Mohammadifar, 2014).

During the last two decades, experts in education have focused more on the issues of cognition and motivation. Cognition includes a series of abilities and intelligent activities such as knowledge acquisition, comprehension, recognition and critical analysis. Motivation constitutes of emotional factors, value evaluation and educational perspective. In most of the studies, the relationship between cognitive and motivational strategies is evaluated on the basis of their correlation with educational advancement.
For example, the result of Palson and Gentry's (1995) study supports a causative relationship among motivational beliefs, cognitive and metacognitive strategies and educational progress in math (Abedi, Saeidipour, Farjollahi and Seif, 2015). Javanmard, Houshmandja and Ahmadzadeh's (2012) study also indicated a positive significant correlation between cognitive and metacognitive strategies and educational motivation among students. Griffin et. al, (2013) have recently reported that effective teaching and focusing on study skills have a positive effect on educational performance and internal motivation of students (Barzegar Befruei, Barzegar Befruei and Mollaei Bahrami, 2014; Hafeziahmadi et al., 2017). However, none of them studied the effects of motivated strategies for learning (MSLQ) on students’ cognitive and meta-cognitive skills as the sectors of a relative network. The main objective of the present study is to identify the effect of teaching motivational learning strategies on cognitive and metacognitive strategies so that through utilizing its findings practically in educational institutions students’ educational difficulties can be obviated. Considering research objectives, the following research hypotheses are developed:

1- MSLQ affects students’ cognitive strategies.
1- MSLQ affects students’ meta-cognitive strategies.

Research Methodology
Research methodology is semi-experimental. Pre-tests and posttest are utilized on both the control and experimental groups. The statistical population of the study includes all the students of psychology in bachelor’s course of the Islamic Azad University, Birjand Branch. 46 students are selected as the statistical sample through utilization of volunteer sampling schemes. Afterwards, the sample are matched statistically in two groups randomly (23 students in the monitored group and the one 23 in the experimental group). In the pre-test, MSLQ was run and those who obtain a score less than 162.5 are selected. After the pre-test, independent variable is implemented and in eight 100 minutes long sessions, the experimental group is instructed MSLQ. Eight sessions are administered in four weeks and after that, post-test is utilized in both experimental and monitored groups.

Research Instrumentations
For data accumulation and their analysis, MSLQ is utilized.

Pintrich and De Groot (1990) developed MSLQ (including 25 questions) so that self-regulated motivated learning skills can be administered. Motivated learning skills include efficiency, objective orientation and examination anxiety. Self-regulated learning skills include cognitive and meta-cognitive strategies. The questions of the adopted questionnaire are of closed types, utilized on the basis of Likert’s five-fold scale: that ranges from totally agree (score 5) to totally disagree (score 1). Pintrich and De Goot Studies (1990) indicate that the reliability of the motivated learning skills of the questionnaire are 0.89, 0.87 and 0.75 and for self-regulated learning skills, statistical values of 0.83 and 0.74 are purveyed as their reliability rates. Validity of the questionnaire is materialized through Hosseininasaab's factor analysis procedure (1998). In this procedure, Cronbach's Alpha is utilized for the motivated learning skills, cognitive and meta-cognitive skills, resulting in statistical values of 0.68, 0.71, 0.77, 0.64 and 0.68 (Mohammad Amini, 2009).

Research Procedure
MSLQ is utilized in eight 100 minutes long sessions in four weeks. Research procedure is a conningling of Nunez's (2011) and Bonner's studies (1996). The former is titled as "Implementation of training programs in self-regulated learning strategies in module format: results of an experience in higher education (Seif, 2013 Rahmati et al., 2017) "and the latter is “Developing self-regulated learners: beyond achievement to self-efficacy”.

Research Findings
This study is administered on 46 students, integrated in experimental and monitored groups. Average age of the experimental and monitored groups are (24/1 ± 7/6) and 23/5 ± 4/7. There exists no statistical difference between the number of male and female participants.

In order to evaluate research hypotheses, T-test and U-Mann-Whitney Test are utilized for assessing normality and abnormality of the procedures.

First Hypothesis
MSLQ affects students’ cognitive strategies. In table number 3, the results regarding normalizing and Levene tests are represented. Due to lack of primary postulations for the T-test, U-Mann-Whitney test is utilized, whose results are represented in table number 4.
Table 1. Name Motivated Learning Strategies (Cognitive and Meta-Cognitive)

<table>
<thead>
<tr>
<th>Session No.</th>
<th>Sessions Overall Content</th>
<th>Sessions Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction of regulation and methodology, Instruction of educational objectives and planning schemes</td>
<td>15, 85</td>
</tr>
<tr>
<td>2</td>
<td>Data analysis, memorizing schemes and comprehension skills, Homework assessment on the basis of memorizing schemes and comprehension skills</td>
<td>90, 10</td>
</tr>
<tr>
<td>3</td>
<td>Learning skills of simple educational materials, Utilization of homework for assessment of learning skills of simple educational materials</td>
<td>90, 10</td>
</tr>
<tr>
<td>4</td>
<td>Utilization skills of complicated educational materials, Utilization of homework for assessment of learning skills of complicated educational materials</td>
<td>90, 10</td>
</tr>
<tr>
<td>5</td>
<td>Meta-cognitive learning strategies, Utilization of homework for assessment of meta-cognitive learning strategies</td>
<td>10, 10</td>
</tr>
<tr>
<td>6</td>
<td>Problem solving procedures, Individual decomposition of problem solving procedures, Facilitation of learners’ problem solving skills</td>
<td>20, 40, 40</td>
</tr>
<tr>
<td>7</td>
<td>Homework accumulation and troubleshooting, Examination preparation, Careful reading strategies</td>
<td>10, 50, 40</td>
</tr>
<tr>
<td>8</td>
<td>Examination anxiety factors, Monitoring of distractions, Learning composure and educational attention, Group homework, collecting homework on examination anxiety and distractions</td>
<td>30, 20, 15, 15</td>
</tr>
</tbody>
</table>

Table 2. Comprehension of Frequency Rates of Participants’ Sex, Age and Marital Status in Experimental and Monitored Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency Test</th>
<th>Frequency Monitoring (%)</th>
<th>Chi-squared Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital Status</td>
<td>Single (82/6) 19</td>
<td>(60/9) 14</td>
<td>P=0.10</td>
</tr>
<tr>
<td></td>
<td>Married (17/4) 4</td>
<td>(39/1) 9</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Male (65/2) 15</td>
<td>(34/8) 8</td>
<td>P=0.04</td>
</tr>
<tr>
<td></td>
<td>Female (65/2) 15</td>
<td>(34/8) 8</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>&lt;20 (30/4) 7</td>
<td>(21/9) 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>21-25 (47/8) 11</td>
<td>(56/4) 13</td>
<td>P=0.74</td>
</tr>
<tr>
<td></td>
<td>&gt;26 (21/8) 5</td>
<td>(21/8) 5</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Normalizing and Levene Tests, Pre-Tests and Post-Tests, Cognitive and Meta-Cognitive Strategies

<table>
<thead>
<tr>
<th>Degree of Freedom</th>
<th>Kolmogorov-Smirnov Test</th>
<th>Statistical Significance</th>
<th>Fisher Test</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>0.262</td>
<td>0.001</td>
<td>6.71</td>
<td>0.013</td>
</tr>
<tr>
<td>23</td>
<td>0.214</td>
<td>0.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>0.112</td>
<td>&gt;0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>0.178</td>
<td>0.057</td>
<td>9.063</td>
<td>0.004</td>
</tr>
</tbody>
</table>

According to the table, statistical value of U-Mann-Whitney test is 48 and its statistical significance is less than 0.05. Therefore, facilitation of cognitive strategies is confirmed, resulting in affirmation of the primary hypothesis of the research.

Second Hypothesis
MSLQ facilitates students’ meta-cognitive strategies. The required postulations for T-test are represented in table number 5. In table number 3, statistical significance of normalizing test for the monitored and experimental groups are more than 0.2 and 0.057 respectively.

According to the table, statistical value of the T-test is –4.295 and its statistical significance is less than 0.05. Therefore, effect of meta-cognitive strategies is confirmed, resulting in affirmation of the second hypothesis of the research.

Discussion and Conclusion
The results of this study show that MSLQ affects students’ cognitive strategies. This finding is directly connected with Weinstein’s and Hume’s study (1998). They believe that learning skills might affect students’ cognitive strategies.
Ghavamabadi’s research (1997) shows that learning skills should facilitate students’ comprehension skills, scheduling schemes and time adaptation, problem solving procedures and cognitive strategies.

Cognitive strategies are methods to manage learning, recall and thinking. These management techniques cause cognitive goals including ‘understanding data’ and ‘meaningful learning’ to realize through successful information processing (Recker, Reijers, Hajo & Sander, 2014) and applying effective techniques in learning (Bermingham, Robert & Michel, 2013) (Schleifer, 2009 cited in Ghanbaritalab and Fouladchang, 2015)

The main objective of cognitive strategies must be education of independent learners who can monitor their learning skills through utilization of motivated strategies as educational facilitative interfaces of students’ educational cognizance.

David Strong (2014) showed in a research that cognitive strategies affect students’ scores in standard tests. More proficient students use various types of cognitive strategies and show more perseverance and usually progress more compared to other students (Ghanbaritalab and Fouladchang, 2015).

Pintrich’s theory regards cognitive strategies as intelligent behaviors, thinking or activity whose objective is to facilitate organization, storage, recovery and most importantly acquisition of knowledge.

The results of this study depict that MSLQ affect students’ meta-cognitive strategies. This finding is in correlation with the findings of the studies represented in this part of the research. Nunez’s study (2011) depicts that self-regulative students acquire higher levels of educational advancement in acquisition of meta-cognitive skills. Karashki’s study (2002) indicates that those exams which are based on learning skills facilitate students’ comprehension, meta-cognitive and educational advancement.

In a study, Abedini, Bagherian and Kadkhodaei (2010) revealed that there is a causative relationship between learning strategies and motivational variables; learners with a positive attitude and internal motivation use learning strategies more than learners with a negative attitude and external motivation (Ghanbaritalab and Fouladchang, 2015).

In other words, self-regulative and successful students are those students who monitor their learning skills through utilization of meta-cognitive methodologies. Therefore, meta-cognitive strategies acquire a determining role in students’ educational advancement. Those students who lack such strategies will have low level educational performance and advancement. The findings of this study revealed that there is a significant positive correlation between metacognitive awareness and educational performance of students. These findings are in accord with the findings of Aure (2013), Ayyub Khan and Ahmad Khan (2013), Rahman et al., (2010) and Delavar et al.(2012). It can be said that the more cognitive awareness a person has, the better they learn and the better they memorize and recall information, and therefore, they will have a better performance (Portaherian, Khosravi and Mohamadifar, 2014). As Kahraman and Sungur (2012) noted, if students study to learn and understand, they highly tend to utilize

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### Table 4. Medium Difference of Cognitive Strategies in Pre-Tests and Post-Tests

<table>
<thead>
<tr>
<th>Cognitive Strategies</th>
<th>Median Difference</th>
<th>Domain</th>
<th>U-Mann-Whitney Test</th>
<th>Statistical Significance</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitored Group</td>
<td>-2</td>
<td>29</td>
<td>48.000</td>
<td>0.001</td>
<td>46</td>
</tr>
<tr>
<td>Experimental Group</td>
<td>4</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Average Difference of Meta-Cognitive Strategies

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitored Group</td>
<td>-0.696</td>
<td>3.052</td>
<td>32.443</td>
<td>4.295</td>
<td>0.001</td>
<td>Supremum Infimum</td>
<td>46</td>
</tr>
<tr>
<td>Experiential Group</td>
<td>5.391</td>
<td>6.073</td>
<td></td>
<td></td>
<td></td>
<td>-3.202</td>
<td></td>
</tr>
</tbody>
</table>
metacognitive strategies that raises learning motivation in them (Portaherian, Khosravi and Mohamadifar, 2014). Researchers found that teachers can help their students to be more successful and play a more active role in their educational destiny (Marufi, Kord Noghabi, Saed Mucheshi, 2014). For instance, findings of Samadi and Davaei’s (2011) study revealed that cognitive, metacognitive and motivational strategies can predict educational progress in students (Mesrabadi and Erfani Adab, 2014).

Generally, the main difference of the present study with previous ones is the fact that the former studies cognitive and meta-cognitive processes as sectors of a well-connected network. These processes include educational programming and objectives, data analysis, learning strategies, cognition, meta-cognition, motivation, problem solving, examination preparation, and attentive measures and coping strategies against examination anxieties.

Another distinguishing characteristic of the present study is its proposition of MSLQ. This procedure includes an educational inset that distances itself from a teacher-based class and approximates its strategies towards group collaborations and self-regulative education. Furthermore, the present study could be regarded as a commingling of Nunez’s (2011), Bonner’s studies and cognitive and meta-cognitive theories.

With regard to the direct relationship between using motivational strategies and cognitive and metacognitive strategies of students and the fact that metacognitive awareness is achievable, institutionalizing utilization of these strategies by the educational system could enhance educational performance of students (Derakhshan and Teimuri, 2015). In fact, instead of focusing on the bulk of learning for learners, more attention should be paid to methods to improve motivation, cognitive and metacognitive skills.

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