

Standardization of Spontaneous Strategies Questionnaire for Learning Pre-University Students of Tehran

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Abstract— The purpose of this study is to standardize of spontaneous learning questionnaire for learning. 566 male and female students were selected using cluster sampling method and completed the questionnaire. Formal and content validity of the questionnaire was confirmed by psychological and psychometric experts. The questionnaire's reliability was calculated by Cronbach's alpha. The questionnaire's construct validity was confirmed by factor analysis and its criterion validity was confirmed by multivariate regression analysis. Obtained validity and reliability obtained for the questionnaire was generally satisfactory which was significant at the level of $P < 0.001$. According to the results of this research, this questionnaire was eligible to be used in academic counseling situations and pre-university student's psychological investigations in the study population.

Index Terms— Spontaneous strategies for learning, self-efficacy, intrinsic value, test anxiety, cognitive strategies, Self-regulation.

1 INTRODUCTION

THIS Several studies suggest that self-regulation in learning not only requires a variety of learning strategies, it needs being provided with adaptive motivational patterns. Bandura (1999) maintains that each person has a self-system which enables him/her to measure and evaluate his/her thoughts and behaviors. Self-system includes cognitive and emotional structures including the abilities such as designing various strategies for learning and behavior self-system (Seyf, Lotfian, 2004).

Pintrich & Degroot (1990) indicates in defining the concept of cognitive and behavioral self-regulation to three components of cognitive strategies, student's efforts and cognitive strategies (Rahmani, 2003).

By metacognitive strategies, it means the set of planning, reviewing and revising processes of cognitive activities. Learning measures are defined as the student's learning on complex homework and the rate of persistence for doing them (Konno, cited in Rahmani, 2003). The term cognitive strategies is used to express a wide family of general plans with mental tactics which is systematized by people to deal with problem solving or learning tasks (Cole and Chan, translated by Maher, 1993).

Psychologists and teachers have been often interested in the factors that affect academic progress, such as intelligence, motivation and the attitude towards education (Wanbelgram, 1998, cited in Zare Bagheri, 2005). However, factors such as stylistics and spontaneous learning have recently been considered. Also, research findings show that mastery on learning concepts and methods and applying them in an appropriate and creative way in new situations aiming to produce knowledge requires having motivational and attitudinal adoptive patterns as well as effective use of learning self-system approaches (Besant, 1995, McLoud, 1992, cited in Seyf et al, 2006).

The above ideas have been considered by many researchers. Hence, reviewing the complex motivational and attitudinal relations and self-system approaches has a special place in the field of education researches.

The current study also aims to investigate, along with this research dimension, spontaneous learning strategies among high school students of 1, 2 and 3 regions in Tehran. Since the motivational beliefs and self-system approaches has a main role in the choice of academic course and continuing education in higher levels. The need to conduct this research among high school students was more felt.

Research performed abroad shows dramatic results regarding Motivational Strategies for Learning Questionnaire (MSLQ). In this model, a significant relationship was achieved between self-regulatory approaches and academic growth. It is therefore aimed in this study to make teachers and students aware of new approaches for learning and facilitating teaching-learning process. If there is a positive relation between variables to enhance student's academic performance, there are some suggestions for students, teachers, counselors and some educational policy makers, for it is the goal of training education of the students who take their own learning responsibility, it is therefore required that this feature be developed among teachers and students.

Motivational Strategies for Learning Questionnaire (MSLQ) can be different in three areas of motivation, learning strategies, time and resources management among student's performance. However, given that MSLQ is designed in American society, its manufacturers often considered environmental features and conditions and applied this questionnaire on the population of their country.

It is therefore possible that cultural differences of the communities in the stability of test results in the time of its application in various countries be effective. Therefore, for proper operation of this tool, it is necessary to standardize it in other countries to use its results in an appropriate way for educational and training education. In other words, it should be noted that this questionnaire should be based on research on content,

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application method, scoring, interpretation which is not generally performed to standardize the questionnaire and is not a standard tool and a good reliability and validity scale for counselors, teachers and educational and training authorities. This study therefore aims to standardize Motivational Strategies for Learning Questionnaire for student's learning in pre-university period in regions 1 and 2 at the pre-province level and the purpose of this study is that the above-mentioned questionnaire is standardized for study population and a step is then taken in the field of MSLQ questionnaire standardization in Iran.

Given the exploratory nature of this research, it is not hypothesized and just some research questions are formulated as follows:

1. Does MSLQ questionnaire have enough reliability about high school students of Tehran?
2. Is there adequate internal coordination regarding MSLQ questionnaire questions?
3. Is the set of MSLQ questionnaire questions is generated out of a general factor?
4. Does MSLQ questionnaire have enough validity?

2 METHOD

The current study is an exploratory research which is performed based on classical psychometric methods. In this case, the psychometric features of MSLQ questionnaire i.e. its validity and reliability has been studied and factor analysis is used to determine components of motivation and learning approaches. In addition, Norm Table has also been developed based on gross scores of sample group and the relationship between motivational and cognitive components and student's academic performance has also been tested.

The statistical community in this research includes all high school students of 1, 2 and 3 regions in Tehran who are studied in the academic year 2007-2008. Since a sample group comprised of at least 500 people is needed in using the factor analysis, (Kerlinjer 2, trnslated by Sharifi, 1997, P. 435), 566 people of students in statistical community are randomly chosen as study sample in such a way that there are 305 girls and 261 boys in the study sample and the age range was 16-20 years with the mean of 16.96 and 0.66 standard deviation.

The main tool for assessment in this study is 44-article questionnaire that called motivational strategies for learning questionnaire (MSLQ) designed by Pintrich and De Grout (1990). MSLQ questionnaire was first developed in America's National Studies Center to enhance learning-teaching in the academic courses higher than high school which have 80 articles. Then this questionnaire was reduced to 44 articles by Pintrich and De Grout in 1990 which includes both motivational beliefs and self-regulated learning strategies and each of these components are made of some sub-scales. In scoring criteria to each question of questionnaire, minimum score is 1 and maximum one is 7 and some questions are also scored in a reverse method. The bigger score is chosen by the subject, the more compatible of that sentence with his/her real behavior.

Table 1 shows validity of MSLQ questionnaire scales achieved by Pintrich and De Grout in a study on 357 high school students for 3 weeks in California.

TABLE 1
CRONBACH'S ALPHA COEFFICIENT FOR MSLQ QUESTIONNAIRE (PINTRICH AND DE GROUT; CITED IN HUSSEINI, 2007)

Nam of scale	Sub-scales	Standardized coefficient
Motivational beliefs	Self-efficiency	0.89
	Internal rate	0.87
Self-regulated learning strategies	Test anxiety	0.75
	Cognitive strategy	0.83
	Self-regulation	0.74

In order to collect data, two areas of Tehran including 9 boy high schools and 9 girl high schools were first randomly chosen. In the next stage, three classes separated by academic course were randomly chosen from each high school and the researcher refereed and coordinated with the education authorities and high school teachers and managers as well as completed the MSLQ questionnaires. Before the test, the students are requested to stipulate their age, gender, academic course and average in the questionnaire and they are noted to thoroughly read all questions of the questionnaire and then mark the proper answer. Also, students are explained that there is no right or wrong answer and should chose an option that most adopted with their personality characteristics. In addition, no time restrictions were implemented and all students completed the questionnaire.

3 FINDINGS

Findings resulted from data statistical analysis is as follows:

MSLQ Questionnaire Validity

To study the validity of the questionnaire, Cronbach's alpha method is used. Table 2 shows the results obtained from this study:

TABLE 2
CRONBACH'S ALPHA COEFFICIENTS FOR MSLQ QUESTIONNAIRE SUB-SCALES

Sub-scale	Alpha coefficient
Self-efficiency	0.544
Internal rate	0.709
Test anxiety	0.528
Cognitive strategies	0.629
Self-regulation	0.638
Motivational beliefs	0.839
Total	0.882

As shown in table 2, alpha coefficient for all questionnaires is 0.882 and for sub-scales is between 0.528 and 0.839. The sub-scales that their validity coefficient is less than 0.7 are due to low number of questions. However, considering the combinatory sub-scales of motivational beliefs with 0.839 validity coefficient, internal rate with 0.709 validity coefficient and total validity coefficient 0.882 indicate that MSLQ questionnaire has generally a good validity coefficient.

MSLQ Questionnaire Structure Validity

To study the validity of questionnaire's structure, factor analysis with principal component analysis 1 (PC) was used. After completing the factor analysis stages, five major factors with special value of more than 1 is achieved for MSLQ questionnaire which has been shown in Table 3.

TABLE 3
SQUARES AND FIVE FACTOR ROTATED LOADINGS WITH SPECIAL VALUE OF MORE THAN 1

Factor	Total	Variance percentage	Density percentage
1	5.153	11.712	11.712
2	4.520	10.272	21.984
3	3.044	6.918	28.902
4	3.000	6.819	35.721
5	2.563	5.825	41.546

As shown in the able table, five factors determine 41.546% of all variance of variables which 11.712% is related to factor one, 10.272% to factor 2, 6.918% to factor three, 6.819% to factor four and 5.825% is related to factor five.

The extracted factors were rotated using orthogonal manner. The rotated factor has been shown in table 4.

TABLE 4
MATRIX OF EXTRACTED FACTORS WITH PRINCIPAL COMPONENT ANALYSIS AFTER THE ROTATION

QUESTIONS	Factor					
S1	0.183	0.160	-0.089	0.119	0.214	
S2	0.505	0.212	0.010	0.320	-0.064	
S3	-0.056	0.027	0.588	-0.141	-0.134	
S4	0.723	0.145	0.019	0.055	0.085	
S5	0.772	0.145	0.019	0.055	0.085	
S6	0.541	0.184	-0.152	0.256	0.026	
S7	0.583	0.134	-0.031	0.197	0.135	
S8	0.634	0.146	0.053	0.355	-0.020	
S9	0.176	0.076	-0.071	0.707	0.091	
S12	-0.028	0.014	0.732	-0.028	-0.068	
S13	0.336	0.187	-0.134	0.570	0.042	
S14	0.364	0.331	-0.090	0.193	0.057	
S15	0.705	0.168	0.058	0.072	0.150	
S16	0.307	0.114	-0.089	0.647	0.188	
S17	0.658	0.091	-0.070	0.118	0.240	
S18	0.178	0.032	-0.017	0.659	0.157	
S20	0.033	0.174	0.669	-0.205	0.026	
S21	0.596	0.234	0.003	0.109	0.186	
S22	0.085	0.060	0.543	-0.098	-0.029	
S23	0.256	0.173	-0.129	0.100	0.463	
S24	0.286	0.464	-0.163	0.017	0.279	
S25	0.156	0.449	-0.005	0.170	0.279	
S26	0.132	-0.069	0.470	-0.159	0.376	
S27	0.073	-0.220	0.464	-0.137	0.190	
S28	0.175	0.501	-0.032	-0.069	0.234	
S30	0.203	0.552	-0.121	0.186	0.104	
S31	0.051	0.177	0.103	0.047	0.670	
S32	0.008	0.333	0.034	0.207	0.475	

S33	-0.084	0.449	0.166	0.273	0.201
S34	-0.269	0.703	-0.057	-0.074	0.042
S35	0.168	0.489	-0.071	0.173	0.244
S37	-0.081	-0.070	0.562	0.0245	-0.045
S38	-0.199	-0.085	0.503	0.151	-0.042
S40	0.071	0.536	0.253	0.025	0.089
S41	0.180	0.697	0.118	0.031	-0.026
S42	0.054	0.269	0.031	0.078	0.578
S43	0.307	0.427	0.092	0.203	0.109

As can be seen in table above, since there is a high correlation among variables, 7 questions of 10, 11, 19, 29, 36, 39 and 44 have been deleted for factor loading of less than 0.4.

As shown in table above, factor one contains factor load as 2, 4, 6, 7, 8, 15, 17 and 21 questions which the factor load of these questions is more than 0.5.

Factor two contains load factors of 24, 25, 28, 30, 33, 34, 35, 36, 39, 40, 41 and 43 questions which the load factor of these questions in factor two is more than 0.4.

Factor three contains load factor of 3, 12, 20, 22, 26, 27, 37 and 38 questions which the load factor of these questions in the first factor is more than 0.4.

Factor four is the load factor of 9, 13, 16 and 18 questions which the load factor of these questions in the fourth factor is more than 0.5.

Fifth factor includes load factor of 23, 31, 32 and 42 questions which all load factor is more than 0.4.

Naming the Factors

Of 9 correlated questions with factor one, questions 2, 6, 7, 8, 11, 15 and 21 are related to self-efficiency scale and indicate that self-efficiency scale is assessed in factor one.

Of 12 questions which are correlated with factor two, questions 24, 25, 28, 33, 34, 35 and 43 are related to internal rate subtest that shows that internal rate is assessed in the second factor.

Of 8 questions which are correlated with the third factor, questions 3, 12, 20, 22, 23, 26 and 38 are related to test-anxiety subtest which shows that test anxiety is assessed in the third factor.

Of four questions that are correlated with the fourth factor, questions 9, 13, 16 and 18 are correlated with subtest of cognitive strategies which shows that this factor assess cognitive strategies.

According to what has been mentioned, it can be said that the content of questionnaire assesses the one said by its manufacturers; therefore MSLQ questionnaire has structure validity.

Title of MSLQ questionnaire factor has been selected according to the number and content of questions. There is a suitable coordination and overlaying between the materials related to each factor in the current study and what has been tested by its manufacturers. Therefore, the appellation of these actors is based on the one chosen by test manufacturers.

Criterion Validity of MSLQ Questionnaire

To determine criterion validity of questionnaire using regression analysis, the contribution of each questionnaire scales in predicting academic performance has been studied. Also, to identify whether regression and Norm Tables should be calculated with sender separation, the difference between two genders have been tested. Results of F test and T test have been

shown in Table 5.

TABLE 5
SIGNIFICANCE TEST OF THE DIFFERENCE BETWEEN MEANS

Component	T	Significance level	I	Degree of freedom	Significance level	High level	Low level
Self-efficiency	0.058	0.810	-2.164	564	0.031	-0.013	-0.287
Internal rate	0.211	0.646	-2.031	564	0.043	-0.005	-0.317
Test anxiety	0.001	0.974	-1.625	564	0.10	0.025	-0.265
Cognitive strategies	0.019	0.890	0.233	564	0.21	0.054	-0.237
Self-regulation	0.491	0.484	-0.986	564	0.050	-0.0001	-0.239
Total	0.057	0.812	-1.962	564	0.050	-0.0001	-0.239

As shown in table above, there is no significant difference between score variances in two boys and girls group and also the difference between mean score of boy and girl students in subtests of self-efficiency, internal rate, motivational beliefs and generally the questionnaire is statistically significant. Therefore, it can be said that the difference between the average of boy and girl students under study are not random; and separate regression and norms for the boys and girls are calculated and provided.

A high correlation was observed in multivariate regression analysis for the boys (0.819), so that MSLQ questionnaire factors are able to determine more than 67% of academic performance of boys sample group. Considering the significance level ($P < 0.05$) showed that there is a significant relationship between academic performance and MSLQ questionnaire factors. To consider the contribution of each factor (predicting variables), their regression and significance coefficients are calculated and the results obtained have been presented in Table 6.

TABLE 6
REGRESSION COEFFICIENT AND SIGNIFICANCE TEST FOR MALE SAMPLE GROUP

Predictive variable	Regression coefficient b	Standard error	Value of Beta	Value of Critical I	Significance level
Width of origin	8.736	0.376	-	23.235	0.001
Cognitive strategies	0.630	0.139	0.353	4.534	0.001
Internal rate	0.369	0.087	0.331	4.225	0.001
Test anxiety	0.298	0.089	0.178	3.348	0.001
Self-efficiency	0.250	0.096	0.137	1.111	0.268
Self-regulation	0.124	0.112	0.083	1.111	0.268

The above table shows that four factors namely cognitive strategies, self-efficiency, internal rate and test anxiety can predict dependent variable (academic performance) of boys sample group ($P < 0.05$).

It can also be states that variables of cognitive strategies ($T=4.225$, $P < 0.01$, $Beta=0.331$) has been mostly contributed in determining academic performance, since this factor causes change as 0.353 in standard deviation of dependent variable

(academic performance) per one unit of change in the standard deviation. It can be generally stated with 99% confidence that these results can be generalized to male group statistical community. Noteworthy, self-regulation component ($T=1.111$, $P=0.268$ and $Beta=0.083$) is not contributed in predicting academic performance.

A high correlation was observed in multivariate regression analysis for the girls (0.905) so that factors of MSLQ questionnaire can generally determine 82% of academic performance of girl sample group. Considering the significance level ($P < 0.05$) showed that there is a significant difference between academic performance and MSLQ questionnaire factors in girls sample group. To study the contribution of each factor (independent variables), their regression coefficients and significance coefficients were calculated. The results have been shown in Table 7.

TABLE 7
REGRESSION COEFFICIENTS AND SIGNIFICANCE TEST FOR GIRL SAMPLE GROUP

Predictive variable	Regression coefficient b	Standard error	Value of Beta	Value of Critical I	Significance level
Width of origin	4.902	0.330	-	14.876	0.000
Cognitive strategies	0.934	0.133	0.408	7.013	0.000
Internal rate	0.438	0.086	0.246	5.633	0.000
Test anxiety	0.479	0.088	0.230	5.644	0.001
Self-efficiency	0.375	0.097	0.161	3.871	0.010
Self-regulation	0.038	0.116	0.018	0.323	0.747

It has been shown in above table that four factors of cognitive strategies, self-efficiency, internal rate and test anxiety can predict academic performance in girls sample group ($P < 0.05$). Considering the value of Beta for each factor shows that cognitive strategies variable has been most contributed in explaining the academic performance, which this factor cause change in the variance deviation of this factor as 0.408 in dependent variable standard deviation (academic performance) per one unit of change in the standard deviation. Therefore, it can be said with 99% confidence that as male sample group, these results can be generalized to statistical community of girls

sample group; however, only self-regulation factor ($T=0.323$, $P=0.747$ and $Beta=0.018$) has not been contributed in predicting academic performance.

Providing Norm Table for MSLQ Questionnaire Factors

The gross scores of students have no meaning by itself and these kinds of scores should be turned into stable and precise scale to make possible changing and interpreting the results. This uniform scale is called norm. Individuals' scores can be compared and interpreted with each other based on this scale. As indicated before, one of the purposes of the present study is to provide norm tables of boys and girls student separately which has been conducted and norm tables is provided for the researcher.

4 DISCUSSION

To answer the first question regarding whether the MSLQ questionnaire has enough validity, Cronbach's alpha was used to assess the questionnaire's reliability. Alpha coefficient for the total questionnaire is achieved 0.882. The results of the present study indicate that MSLQ questionnaire has enough and suitable reliability and this questionnaire can be used as a reliable tool.

To answer the second question indicating whether there is internal coordination in the MSLQ questionnaire's questions, the reliable coefficient was obtained for the questionnaire's subscales and the total questionnaire which all of them was higher than 0.6. Results of research show that set of MSLQ questionnaire's questions have required internal coordination. To answer the third question whether the set of MSLQ questionnaire's questions is resulted from a general factor, after confirming the formal and content validity of the questionnaire from the psychometric and psychological professionals for studying the reliability of MSLQ questionnaire's structure, factor analysis was used. After applying five-fold factor analysis, a special value more than one was obtained and these five factors altogether determined 41.546 of total variables variance, of which 11.712 is related to the first factor, 10.272 is related to the second factor, 6.918 the third factor, 6.819 the fourth factor and 5.825 is related to the fifth factor. Therefore, there is coordination and overlaying among the factors obtained in the present study and what test constructors obtained and it can be said that MSLQ questionnaire has the structure validity. Therefore, the appellation of these factors is based on the ones chosen by test constructors, which has been done as follows:

Factor one is self-efficiency, factor two internal rate, factor three test anxiety and factor four cognitive strategies and factor five is self-regulation.

To answer question four whether MSLQ questionnaire has enough reliability, multivariate regression analysis to obtain the questionnaire's criterion validity was used. Results of regression analysis shows that other than self-regulation factor, other predicting variables predicts the dependent variable (academic performance) which indicate a linear and significant relationship between dependent and independent variables in the current study.

Pintrich and De Groot (1990) found in results of regression analysis that self-regulated learning strategies, internal rate,

test anxiety and self-efficiency are the highest and least predictors for academic performance, respectively. Therefore, findings of the above researches is compatible with the one obtained in the present study and MSLQ questionnaire has enough criterion validity.

Finally, percentage grades and standardized scores of T and Z are developed for sample group in the questionnaire with gender separation.

Generally, findings of this research show that MSLQ questionnaire can be used as a reliable and valid tool to assess motivational learning strategies of pre-university students in Ardebil pre-province.

The present study is performed for the high school period; therefore, it must be avoided to generalize it for other academic courses.

Lack of standardization record regarding MSLQ questionnaire before the present study in Iran to compare research results are suggested based on what has been proposed and make students aware of resources and time management, using self-regulated learning skills during the academic year by holding educational workshops and giving enough awareness of the impacts of self-regulated learning strategies in the academic progress.

The counselors of high school students should assign opportunities to identify student's learning problems and reduce their learning problems utilizing self-regulated learning strategies.

School authorities should give required education to student's families regarding self-regulated learning strategies.

Given that MSLQ questionnaire factors are suitable predictors for student's academic progress, the educational authorities are suggested to use this questionnaire to predict student's academic performance in various academic stages.

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