Empirical research

Psychometric Properties of the Georgian Version of Motivated Strategies for Learning Questionnaire (MSLQ)

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Abstract

The article concerns the psychometric properties of the Georgian version of the Motivated Strategies for Learning Questionnaire (MSLQ) such as factorial properties, internal consistency of the sub-scales and gender differences by factors of the motivation and learning strategies scales. 560 Bachelor program students from 17 higher education institutions participated in the study. The instrument assessing motivation and self–regulated learning combine two main scales: 1) motivational orientation scale, and 2) learning strategies scale. There are 81-items in the

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instrument measured on a 7-point Likert type scale where point 1 means 'Does not at all correspond' and point 7 'Fully corresponds'. The administration of the questionnaire requires about 20-30 minutes. Study results show that the Georgian version of the Motivated Strategies for Learning Questionnaire is similar by factorial properties to the original version of the instrument. Internal consistency value is .70 for the motivation scale and .80 for learning strategies scale which meets the instrument validation standard. Reliability values for the factors in the scales range from .51 to .89. As for gender differences, male and female respondents showed statistically significant difference on both motivation factors (task value, control beliefs and self-efficacy for learning) and learning strategies factors (elaboration, organization, metacognitive self-regulation, time and study environment management and effort regulation). The above findings lead to the conclusion that the Georgian version of Motivated Strategies for Learning Questionnaire can be used for future research purposes.

Key words: self–regulated learning, measurement instrument, learning motivation scale, metacognitive strategies scale.

Introduction

The article presents the main stages and results of the study examining the psychometric properties of the Georgian version of the Motivated Strategies for Learning Questionnaire (MSLQ-GEO).

The learner's ability to control his/her cognitions, behaviors and emotions has a big impact on the learning process and academic performance (Schunk & H, 2012). Barry Zimmerman, the author of the first scientific article on self-regulated learning, developed three independent theoretical models of self-regulated learning (Zimmerman B. J., 1986). The article published in 1986 had a considerable influence on scientific community. It should be noted that researchers started to differentiate self-regulated learning and metacognition as two independent constructs (Panadero, 2017). Nowadays, self-regulated learning is one of the important directions of educational psychology.

Self-regulated learning is a conceptual frame for understanding the influence of the learner's cognitive, emotional and motivational factors on the learning process (Zimmerman B. J., 1990). Self-regulated learning uses holistic approach to the impact of the learner's individual and contextual factors on the learning process (Schunk & H, 2012).

The ideas based on the main assumptions of socio-cognitive theories and discussed in Zimmerman's fundamental work stimulated development of various theoretical models of self-regulated learning. These models and their practical implications are still important today. There are currently six main models of self-regulated learning developed by Zimmerman (Zimmerman B. J., 1986), Boeakaerts (Boekaerts, 1991), Winne and Hadwin (Winne & Hadwin, 1998), Efklides (Efklides, 2011), Hadwin, Jarvela and Miller (Hadwin, Jarvela, & Miller, 2011) and Paul Pintrich (Pintrich P. R., 1991).

The instrument of motivated strategies for learning was developed by Paul Pintrich who believed that the process of learning was equally influenced by social factors and contextual factors related to study environment (Paul R. Pintrich D. A., 1991). Pintrich's model of self-regulated learning emphasizes the following components: To understand the meaning of the learning process it is necessary to consider the learner's motivation, his/her values and expectations, the reasons for being involved in learning, how interesting, important or useful the learning process is for the learner, how strongly she/he believes that their efforts will entail certain results, that they will be able to cope with the tasks and activities involved in the learning process, how competent they see themselves and what beliefs they hold about their success and failures (Pintrich P. R., 1991).

The affective component which influences how enjoyable the learning process is for the learner, his/her anxieties related to expected learning activities and their ability to control and regulate emotions during learning should be also taken into consideration (Pintrich P. R., 1996).

However, the examination of the motivational component of learning is not enough. It is also important to consider the learner's cognitive abilities, whether she/he uses cognitive and metacognitive strategies during learning, whether they are successful in elaborating, organizing

and rehearsing new ideas, how they activate critical thinking and use self-regulated strategies to achieve the learning goals (Pintrich P. R., 2004).

According to P. Pintrich, in addition to being influenced by learners' individual factors (motivation, cognition, affect, metacognition) the learning process is also influenced by contextual components characteristic of study environment (Paul R. Pintrich R. W., 1993). Important contextual factors include classroom atmosphere, teaching methods, the teacher's competence and behavior, established rules and models for acceptable behavior in the classroom, to what extent the environment is consistent with the goals of learning, student-teacher interaction type, distribution and management of learning resources, etc. According to Pintrich, the above listed components are closely interrelated and equally influence the learner's functioning (Paul R. Pintrich R. W., 1993).

The instrument of motivation and self-regulated learning has been developed to measure the motivational, cognitive and contextual components included in Pintrich's model. The instrument enables us to use the empirical methods to assess the learner's motivational orientations (intrinsic and extrinsic goal orientations), beliefs related to task value, self-efficacy related perceptions, control beliefs, the use of cognitive and metacognitive strategies like rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, effort regulation, and the factors related to the self-management necessary for the learning process, like planning time and study environment, peer learning and help seeking (Pintrich P. R., 1991).

It is important to note that the 81-item questionnaire of motivated strategies for learning (MSLQ) is the most popular instrument measuring self-regulated learning. The instrument has been translated into different languages and adapted to different cultures. There are Czech (Vaculíková, 2016), Turkish (Şirin Karadeniz, 2008), Columbian (Ramírez Echeverry, García Carrillo, & Olarte Dussan, 2016), Estonian (Saks, Leijen, Edovald, & Õun, 2014), Pakistani (Nausheen, 2016), Italian (Olivari, Confalonieri, & Bonanomi, 2015), Chinese (Zhou & Wang, 2021), Indian (Dangwal & Gope, 2011) and Singapuri (Betsy Ng, 2017) versions of the instrument.

Motivated Strategies for Learning Questionnaire (MSLQ) is often used with elementary and secondary school students as well as the students in the institutions for higher education and the educational programs for adult population (e.g., teacher training) (Pintrich P. R., 1991).

The above instrument makes it possible to examine learners' motivational orientations and self-regulated learning skills in the context of academic a

chievements, self-efficacy, self-monitoring, metacognition, distant learning, adult education, etc. (Schunk & H, 2012). It also enables us to analyze the nature of the individual learner's motivational components and learning strategies and differentiate cognitive, affective and behavioral factors involved in the process of teaching and learning. Consequently, it makes it possible to reveal the main challenges faced by the learner when studying different courses or subjects (Artino, 2005). The data obtained by the instrument enables teachers and instructors to develop different methods of assistance tailored to individual needs (Duncan & Mckeachie, 2005).

Despite the practical value of the instrument researchers should also take into consideration the main limitations related to its application. In particular, the theoretical model of self-regulated learning considers the situational factor of the process, which is the specificity and content of a particular course/subject (Artino, 2005). In the course of the administration of the named instrument, the learner responds to the items from the perspective of the above factor, which makes it impossible to generalize the obtained results to the entire learning process and/or the learner's general motivation or learning strategies. Generalization of the results is limited to the course/subject in relation to which the learner gives his/her responses. This limitation of the instrument also makes it impossible to determine the norms for the considered factors (age, ethnic and other norms) (Duncan & Mckeachie, 2005).

Method

Participants and the procedure

560 Bachelor program students in Georgia's higher education institutions participated in the study - 433 females (77%) and 127 males (23%). The age of 56% of participants ranged from 16 to 20 years, participants aged from 21- to 25 years made up 43% and those from 26 to 30 years - 1%. ($M_{age} = 20{,}23; SD = 1{,}65;\ min = 16; max = 27$). Out of research participant's BA first year students made up 24%, second year students - 37% third year students - 21% and fourth year students - 16%. Participants that took extra semester constituted 1.2 %. Research participants were the students of different BA programs at 17 higher education institutions operating in Georgia.

The study used the questionnaire technique. In particular, an electronic version of the instrument was developed and distributed to BA students at Georgia's higher education institutions via different communication networks. Participation in the study was voluntary and participants did not receive any participation benefits. The online version of the questionnaire contained several sections. In the first section respondents were presented with an informed consent form which explained the purpose of the study, instruction for the completion of the questionnaire and the researchers' contact information. In the case of consent respondents went to the main part of the questionnaire. They were asked to choose a preferred subject/course and respond to the items referring to the subject/course of their choice.

Participants responded to 81 items from their personal point of view on a 7 point Likert type scale, where point 1 means 'Does not at all correspond' and point 7 'Fully corresponds'. The administration of the questionnaire required about 20-30 minutes.

Description of the instrument

The Motivated Strategies for Learning Questionnaire (MSLQ) was developed as the motivational orientation of the learner and the way they use different learning strategies. The language of the original version of the questionnaire is English. The instrument was developed by P. Pintrich (Paul R. Pintrich D. A., 1991). According to the theoretical model developed by Pintrich motivation and self-regulated learning are multi-factor constructs. Consequently, they combine two main scales: 1) motivational orientation scale, and 2) learning strategies scale. The model is based on the principle assumptions of socio-cognitive theories. The theoretical framework of the questionnaire involves expectations, values and affect as its components. The motivation scale consists of 31 items which measure the learner's expectations and values related to the subject/course in question. The scale combines 6 major factors: orientation on intrinsic goals, orientation on extrinsic goals, task value, beliefs related to control, self-efficacy for learning and anxiety related to testing.

The second scale of MSLQ measures the learner's cognitive and metacognitive strategies and necessary learning resources like the management of time and space allocated for learning in relation to a specific subject /course. Learning strategies scale includes 50 items and each item fits

9 factors. Learning strategies scale includes the following factors: rehearsal strategy, elaboration strategy, organization strategy, critical thinking, metacognitive self-regulation, management of time and study environment, effort regulation, help seeking and peer learning.

Translation and linguistic validation

Although it is free and allowed to validate and adapt the questionnaire (Pintrich P. R., 1991), we consulted the group of authors of the original version of the instrument regarding the necessary procedures and received their recommendations. At the initial stage of the adaptation the English version of the questionnaire was translated into Georgian by seven researchers[2]. After that, the translated version underwent expert analysis to check for consistency between the translation and back translation. Following expert analysis and recommendations 81 items were modified. In particular, equivalence of Georgian and English terminology, the length of items and word frequency were taken into consideration.

The final version of the questionnaire was once again evaluated by a Georgian philologist)[3], who fixed the items orthographically and syntactically and gave recommendations concerning stylistic mistakes. All of the recommendations mentioned above were considered for the final version of the questionnaire.

Results

Data Analysis

The following analysis methods were used to evaluate the psychometric properties of the Georgian version of the Motivated Strategies for Learning Questionnaire: 1) confirmatory factor analysis to check the factor structure of the instrument; 2) internal consistency characteristics to determine the reliability of the scales and 3) independent samples t-test to detect gender differences.

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[2] Linguistic validation involved the following researchers: Givi Makharadze, Gvantsa Begiashvili, Otar Sokhadze, Anna Chaika, Sopo Antauri, Tamar Laliashvili, Tinatin Gogmachadze.

[3] The group of authors expresses gratitude to Nino Sharashenidze, Associate Professor of Tbilisi Ivane Javakhishvili State University for the above contribution.

The listed statistical procedures were performed using IBM.SPSS-version 23.0 and SPSS.AMOS-version 23.0.

Psychometric properties of the Motivated Strategies for Learning Questionnaire

Confirmatory factor analysis

To examine the factorial properties of the Georgian version of the Motivated Strategies for Learning Questionnaire, both the motivation and learning strategies scales were tested using structural equation modeling (SEM). Unlike EFA, which captures the existing structure of empirical data and is less useful for testing preconceived concepts and theories, this analysis allows to determine to what extent the preconceived vision (concept, theory, instrument) is supported by empirical data and confirms our assumption (Ockey, 2013). An independent model was created for both scales and the interrelatedness of each sub-scale was tested via AMOS-23.

The maximum likelihood method was used to check the factorial structure of the motivation scale. A statistical measure of model fit is the chi-square (X^2), which shows how large the difference is between the variance and covariance matrices in the observed and expected results. According to the obtained results, model fit in the case of the motivation scale is: $X^2(560) = 1977.7$; p=.000. In addition, we used other indices of normalized model fit, such as the comparative fit index (CFI), ratio between the chi-square (X^2) statistic and degrees of freedom, Hoelter's critical N (CN), and the root-mean-square error of approximation (RMR). The results of the confirmatory factor analysis for the motivation scale - CFI=.80; X^2/ df = 4.45; CN=140 and RMR=.08 (see Table N1) - show that the model fit of the empirical and theoretical model is satisfactory.

The maximum likelihood method was also used to test the factorial structure of the learning strategies scale. The overall model fit for the learning strategies scale is as follows: X^2 (560)= 45265.3; p=.000. As for the indicators of the model's normed fit index, the results of the confirmatory factor analysis indicate that for the learning strategies scale CFI=.64; X2 / *df* = 4.47; CN=134 and RMR=.08 (see Table N1), which shows that the model fit of the empirical and theoretical model is satisfactory.

The authors of the original version indicate that in the case of CFI, the index of fit should be preferably equal to and/or greater than .9; in the case of RMR, the desired fit index is .05 or/or less; in the case of CN, 200 or/ and more indicators are preferable, while in the case of X^2 / df, a good fit of the model is when the ratio is less than 5 (Pintrich P. R., 1991).

According to the authors, the original version of the Motivated Strategies for Learning Questionnaire has been applied to different courses/subjects. Therefore, the motivational orientations and learning strategies of learners can change according to significant contextual circumstances, such as: course characteristics, teacher's/lecturer's characteristics, course requirements, student traits, etc. (Paul R. Pintrich D. A., 1991). Hence, the obtained indicators, considering the factors mentioned above, show the goodness- of- fit of the model. This applies to the Georgian version of the instrument as well. Therefore, we can conclude that the Georgian version of the instrument shows and repeats the psychometric properties and validity of the original version (see Table N1).

Table 1. Normalized fit indices for Georgian and original versions

Scale	X^2 / df	CFI	RMR	CN *
Georgian Version				
1.Motivation Scale	4.45	.80	.08	140
2.Metacognitive Strategies Scale	4.47	.64	.08	134
Original version				
1 Motivation Scale	3.49	.7	.07	122
2 Metacognitive Strategies Scale	2.26	.78	.08	180

*Note: *p* $<.005$

Internal Consistency

To determine the internal consistency of the questionnaire, we checked the reliability of the individual scales as well as the factors included in both scales (15 factors in total). Cronbach's alpha was used to test reliability. Cronbach's alpha for the overall motivational scale is .70, and alpha for the overall learning strategies scale is .80.

As for the internal consistency of the factors included in the scales, reliability values ranged from .51 to .89. The lowest value was recorded for one of the factors of the learning strategies scale - help seeking, whereas the highest values were recorded for the following factors of the motivation scale: task value and self-efficacy for learning (see Table N2).

Table 2. Internal consistency values for the Georgian and original versions

Factors	Georgian version Cronbach's alpha (α)	Original version Cronbach's alpha (α)
1 – INTRINSIC GOAL ORIENTATION	.70	.74
2- EXTRINSIC GOAL ORIENTATION	.59	.62
3- TASK VALUE	.89	.90
4- SELF-EFFICACY FOR LEARNING	.89	.93
5- TEST ANXIETY	.74	.80
6-REHEARSAL	.67	.69
7-ELABORATION	.76	.76
8-ORGANIZATION	.69	.64
9-CRITICAL THINKING	.74	.80
10-METACOGNITIVE SELF-REGULATION	.75	.79
11-TIME AND STUDY ENVIRONMENT	.70	.76
12-EFFORT REGULATION	.64	.69
13-PEER LEARNING	.78	.76
14-HELP SEEKING	.51	.52
15-CONTROL BELIEFS	.67	.68

Note: $\rho < .005$

Gender differences in motivational and self-regulated learning factors

Independent samples t-test was used to compare gender-based differences between students. The mean scores of females were mostly higher than those of males. Specifically, a

statistically significant difference was found in the case of several factors. For the motivation scale factors, statistically significant difference was observed for task value (t560=-3.45, ρ<.005), control beliefs (t560=-2.64, ρ<.005) and self-efficacy for learning (t560=-2.25, ρ<.005). 005) (see Table N3).

On the learning strategies scale, statistically significant gender difference was observed for the following factors: elaboration (t560=-2.541, ρ<.005), organization (t560=3.024, ρ<.005), metacognitive self-regulation (t560=2.172, ρ <.005), time and study environment (t560=3.805, ρ<.005), effort regulation (t560= -3.745, ρ<.005) and rehearsal (t560=2.514, ρ<.005) (see Table N3).

Table 3 Evaluation of gender differences by factors in the Motivated Strategies for Learning Questionnaire

Factors	Overall M(SD)	Female M(SD)	Male M(SD)	*t***
	N=560	*N=433*	*N=127*	
INTRINSIC GOAL ORIENTATION	5.50(1.08)	5.55(1.07)	5.34(1.11)	-1.906
EXTRINSIC GOAL ORIENTATION	5.18(1.25)	5.23(1.21)	5.01(1.37)	-1.761
TASK VALUE	6.12(1.03)	6.20(.99)	5.85(1.09)	-3.452**
CONTROL BELIEFS	5.78(.99)	5.84(.95)	5.57(1.10)	-2.645**
SELF – EFFICACY FOR LEARNING	5.64(1.04)	5.69(1.01)	5.45(1.13)	-2.259**
TEST ANXIETY	3.97(1.39)	4.02(1.35)	3.80(1.51)	-1.598
REHEARSAL	4.80(1.28)	4.86(1.28)	4.61(1.29)	-1.965**
ELABORATION	5.34(1.07)	5.40(1.07)	5.13(1.03)	-2.514**
ORGANIZATION	4.94(1.36)	5.03(1.34)	4.62(1.36)	-3.024**
CRITICAL THINKING	4.61(1.22)	4.60(1.23)	4.64(1.19)	.327
METACOGNITIVE SELF-REGULATION	4.76(.90)	4.81(.91)	4.61(.86)	-2.172**
TIME AND STUDY ENVIRONMENT MANAGEMENT	5.17(.99)	5.25(.97)	4.88(1.00)	-3.805**
EFFORT REGULATION	5.08(1.23)	5.19(1.19)	4.72(1.31)	-3.745**
PEER LEARNING	3.62(1.68)	3.56(1.68)	3.83(1.68)	1.569
HELP SEEKING	3.77(1.25)	3.73(1.26)	3.90(1.22)	1.308

Note: $^{**}\rho < .005$

Conclusion

Study results show that the Georgian version of the Motivated Strategies for Learning Questionnaire repeats the psychometric properties and tendencies of the original version of the instrument. Reliability values for each sub-scale of the questionnaire are high or satisfactory. All the scales of the Georgian and original versions agree in terms of consistency. This is true for sub-scales with high and low consistency values.

Internal consistency value is .70 for the motivation scale and .80 for learning strategies scale, which meets the instrument validation standard.

As for gender differences, male and female respondents showed statistically significant difference on motivational and learning strategies factors: task value, control beliefs and self-efficacy for learning (motivational factors) and elaboration, organization, metacognitive self-regulation, time and study environment management and effort regulation (learning strategy factors). It is important to note that female's scores exceeded male respondents' scores for all factors.

The above findings lead to the conclusion that the Georgian version of Motivated Strategies for Learning Questionnaire can be used for research purposes. In addition, this instrument can be used for future examination of other factors.

Interested researchers can use both complete version of the questionnaire as well as its individual scales. However, it is important to remember the major limitation of the instrument: the motivation and learning strategies factors are measured in relation to a specific subject/course, which limits the generalizability of the obtained results and makes it impossible to draw conclusions about general tendencies and inclinations.

As for future research, it would be interesting to compare two sets of findings: obtained with the use of Pintrich's self-regulated learning instrument and Learning and Studies Strategy Inventory (LASS). Both instruments evaluate identical constructs of motivational components and learning strategies, but in the case of Learning and Studies Strategy Inventory (LASS) the items refer to learning and study strategies in general and are not restricted to specific courses/subjects.

Consequently, Weinstein's instrument has no limitations in terms of defining normative values and generalization of the learner's tendencies and inclinations (Weinstein, Palmer, & Acee, 2016).

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