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The Validity and Reliability Study of the Czech Version of the Motivated Strategies for Learning Questionnaire (MSLQ)

Abstract

This study reports on the validation of the Motivated Strategies for Learning Questionnaire (MSLQ), a self-report, Likert-scaled instrument, developed by Pintrich et al. (1991). The instrument consists of two sections, i.e., motivation in the process of self-regulated learning and the learning strategies of university students. The adaptation concerned only the first section, the learning strategies section was not part of the adaptation. The sample consisted of 284 students of the Faculty of Humanities at Tomas Bata University in Zlín (256 women and 28 men). The average age was 24, ranging from 19 to 49, with a standard deviation of 6.4 years. Within the adaptation of the MSLQ for the Czech educational environment, the exploratory and confirmatory factor analyses, Cattell's scree test and parallel Monte Carlo analysis were performed. As a result, a 3-factor model was generated. The motivation scales tap into three broad areas: (1) expectancy (represented by academic self-efficacy; 4 items), (2) value (represented by task value; 6 items), and (3) affect (represented by test anxiety; 7 items). The internal consistency (Alphas) of the subscales varies from 0.76 to 0.84. Significant correlation between Academic self-efficacy and Task value subscales was .377. The results correspond to the theoretical model.

Keywords: *adaptation of MSLQ, motivational aspects of self-regulated learning, construct validity: exploratory factor analysis (EFA), confirmatory factor analysis (CFA), internal consistency*

1. Introduction

The research into the processes of self-regulated learning is a response to the current need to develop theory on how to equip future graduates with skills beyond the ones in their field of study – the skills that are increasingly important in today's workplace. Understanding how independent learning is regulated and how to educate students to use self-regulated learning may lead to an improvement in students' study habits, specifically, in the acquisition of skills that go beyond the normal boundaries of the profession.

Many studies suggest that self-regulation is used by a student who directs his/her learning without being directed from the outside. Rather than taking a passive role, self-regulated learners are active participants in the learning process who seek new information and take steps to master new skills. Self-regulating skills cannot be considered inborn mental skills or acquired learning skills; rather they are the self-directive processes by which learners transform their mental abilities into academic skills (Zimmerman, 2001). At a certain stage in life (between ages 6 and 12) the brain is optimally suited for self-regulation, and self-regulation is a part of one's healthy lifelong development. This process continues and can be strengthened at any stage of life (Mareš, 1998).

Self-regulated learning has become a widely discussed issue nowadays from different perspectives (Boekarts, Musso, & Cascallar, 2012; Boruchovitch & Ganda, 2013; Brandmo & Berger, 2013; Kohen & Kramarski, 2013; Schmitz, Klug, & Schmidt, 2011; Vávrová, Hladík, & Hrbáčková, 2012). The contemporary information society emphasizes not only people's professional knowledge, but also the development of their intelligence and social and emotional skills. Those attributes are closely linked with learning issues.

What characterizes self-regulated students (Winne, 1995; Zimmerman, 2001, 2002) is that they believe learning is a proactive process, they are self-motivated and they use strategies that allow them to reach their desired academic results, and they see themselves as agents of their own behavior. In this sense, learning is not something directed at students, but something that comes from students themselves.

In the process of learning, the student regulates the following aspects of learning:

1. *The cognitive aspect*: the student selects necessary learning strategies which help him/her to achieve learning goals.
2. *The metacognitive aspect*: the student controls, monitors, and evaluates the learning process.

3. *The motivational aspect*: motivation and will are engaged at the beginning of the learning process.

Self-regulated learning is the current issue of researchers such as Boekaerts (2002), Pintrich (2002), Zimmerman (2002), Zimmerman and Martinez-Pons (1990), Deci and Ryan (2000a, 2000b). Among the self-regulated learning models, Pintrich's model (2000) is highlighted as one of the most important attempts at synthesizing the different processes and activities which help to increase self-regulation in learning. Our study builds on motivational aspects that stand side by side with cognitive and metacognitive aspects as part of the self-regulated learning process.

Resent research on student academic performance has stressed the importance of considering the motivational components of classroom learning. The ability to self-regulate one's learning is increasingly being seen as a good predictor of the student's academic success. Nevertheless, very little empirical research has examined this field of interest. The presented study seeks to address this gap in the literature.

2. Method

The aim of the presented study was to validate the Czech version of the Motivated Strategies for Learning Questionnaire (MSLQ). The adapted version of the MSLQ is named MoSU (*Dotazník motivačních strategií v učení*).

Measurement

The MSLQ was developed by Pintrich et al. (1991) and is designed to assess university students' use of different learning strategies and their motivational orientations. There are two sections of the MSLQ, a motivation section (items 1 to 31), and a learning strategies section (items 32 to 81). The learning strategies section, however, was not included in the MSLQ adaptation process for the Czech educational environment. The items of the MSLQ are scored on a 7-point Likert scale, ranging from 1 (not at all true of me) to 7 (very true of me). Negatively worded item ratings have to be reversed before an individual's score is computed. The motivation section has 6 factors and the learning strategies section has 9 factors, which can be used separately or together depending on the researchers' purpose.

The instrument preparation

The MSLQ was translated into Czech by the authors of this study under the supervision of an expert in the field of the English language and Education. Using

the original instrument in a different educational environment often requires thorough adaptation. Not only is the original wording frequently changed, but also new items are added. We created new items to function optimally and to fit appropriately into the dimensions of the questionnaire. The original number of 31 items was increased to a total of 70 items. The preliminary version of the questionnaire was subsequently pilot-tested.

Before analysis, the respondents with incomplete or wrong forms of questionnaires had been excluded from the data set. In addition, extreme values of each item with means under 1.75 or over 6.25 had been removed and the normal distribution of the data was checked for future data processing.

Sample

The sample consisted of 284 students of the Faculty of Humanities at Tomas Bata University in Zlín who participated in the survey during the 2013 spring semester. Out of that number, 73.6% of the students were full time students and 26.4% of them were part-time students. They majors were Social Pedagogy, Philology, and Health and Social Care (average age was 24, ranging from 19 to 49, with a standard deviation of 6.4 years). As concerns the distribution by sex, 90.2% of the students were female and 9.8% of the students were male. The students' academic performance varied in the range of A (0.4%) to F (2%); out of that number, more than half of the sample (52%) had Cs. The majority of them were first-year Bachelor's degree students and half of the sample was represented by students of general nursing (cf., Table 1).

Table 1. The distribution of the sample

Levels of academic degrees				The sample distribution according to study majors					
1st year BS	2nd year BS	3rd year BS	1st year MEd	Health and Social Care	English for Business	German for Business	Social Pedagogy	General Nursing	Mid-wifery
41.2%	32.4%	16.2%	10.2%	9.5%	14.4%	3.9%	10.2%	50.8%	11.3%

3. Results

The aim of the presented study was to verify if the Czech version of the MSLQ had satisfactory construct validity. For this purpose factor analyses were performed. Internal consistency of the questionnaire was checked using Cronbach's alpha.

To verify if the data set was suitable for EFA, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was checked. The calculated KMO was 0.874. In addition, Bartlett's Test of Sphericity was calculated yielding $x^2 = 2945.233$; $df = 351$; $p < 0.000$. Both calculations showed that using EFA was appropriate with this data set.

To determine the number of factors, or latent variables, inferred from patterns of association among sets of observed variables, the Scree plot was used and parallel Monte Carlo analysis was performed, suggesting a three-factor solution. Principal Component (PCA) with Varimax rotation for a number of factor solutions was performed, yielding an interpretable structure with items clustered into three underlying factors. The three extracted factors explained 47% of variance (cf., Table 2). All items with factor loadings less than 0.55 or cross-loaded items were excluded, thus the number of items was reduced from 70 to 19.

Table 2. Total Initial Eigenvalues

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	6.399	23.699	23.699
2	4.353	16.122	39.821
3	2.070	7.666	47.487

Factor 1 (cf., Table 3) consisted of 6 items with factor loadings from .738 (*Although the course is difficult, I can make an effort to handle it*) to .600 (*Considering the difficulty of the courses, the teacher, and my skills, I think I will do well in my academic tasks*) and accounted for most of the total variance of 23.7%. As far as factor 1 is considered, item analysis suggested that it measures the belief that the student has about his/her own abilities needed for the learning process. It also expresses the belief how the student subjectively evaluates his/her potential to perform with some level of success while doing certain activities. This factor was labeled *Academic self-efficacy*.

Factor 2 consisted of 6 items and accounted for 16.1% of the variance in the total scale. The range of factor loadings was from .806 (*I am very interested in the content area of my courses*) to .639 (*I study because I want to learn something new*). Factor 2 was interpreted as the task value and the necessity and usefulness of the course. The engagement process of self-regulated learning is rising if the activities are perceived as meaningful and inducing personal interest to be part of it and if the student sees it as beneficial. The conviction of the high value of the task leads

to students' better involvement in their learning process, as the tasks are perceived as being interesting, helpful and useful. This factor was labeled as *Task value*.

Factor 3 consisted of 7 items with factor loadings from .792 (*I feel my heart beating fast when I take an exam*) to .602 (*It is difficult for me to concentrate while taking an exam*) and accounted for 7.7% of the variance. All of those items are reversible and it was necessary to recode those items in order to determine the overall level of motivation in the process of self-regulated learning. Factor 3 expresses the feelings of anxiety that the student experiences during a challenging period of study, which is primarily the examination period of the semester. Since the factor includes aspects of anxiety, it was labeled *Test anxiety*.

Cronbach's alpha for the 19-item questionnaire is .798, demonstrating a moderate internal consistency. The students' judgments of their *academic self-efficacy* for learning (Factor 1) reached the internal consistency of alpha .806. *Task value* beliefs concerning the students' ratings about how interesting, useful, and important the course was for them (Factor 2) also proved to be internally consistent (a = .842) and the *test anxiety* (Factor 3) yielded the internal consistency of a = .842. To sum up, the alphas of the factors and EFA suggest that the general model of motivational aspects of self-regulated learning with three scales is a reasonable representation of the data.

In addition, the utility of the theoretical model and its implementation in the MSLQ scales were tested by confirmatory factor analysis (CFA) with maximum likelihood method. In contrast to EFA, CFA required the identification of which items should fall onto which factors (latent variables). In other words, CFA allowed for a quantitative test of the theoretical model of 3 factors resulting from previously employed EFA.

Model fit was evaluated through several fit indices. The minimum requirements for good model fit were non-significant x^2 – fit statistic, a chi-square to degrees of freedom ratio (x^2/df) of less than 3 and their GOF indexes Root Mean-Square Residual (RMR) of .50 or less, a Root Mean Square Error of Approximation (RMSEA) ranging from .05 to .10, a Comparative Fit Index (CFI) greater than .90, a Goodness-of-fit Index (GFI) and Adjusted Goodness-of-fit Index (AGFI) of .85 or greater and a *p* of Close Fit (PCLOSE) greater than .05 are heuristic values that indicate that the model fits the input date well.

Firstly, for a model with 3 factors set in the scale, goodness of fit (GOF) statistics were calculated. As a result, x^2 (df = 149, p = .000) = 316.300, x^2/df = 2.123, RMR = = .163, RMSEA = .063, CFI = .910, GFI = .896, AGFI = .868, PCLOSE = .014 pointed out that the model was not fit with the expected level. Concerning the results, factor loading of each item in its own factor was high

Table 3. Factor loadings of the adapted version of the MSLQ, called MoSU (Dotazník motivačních strategií v učení)

No.	Item*	Factor		
		F_1	F_2	F_3
1.	If needed, I can learn a lot.	.735		
21.	Although the course is difficult, I can make an effort to handle it.	.738		
7.	I'm confident that I can do an excellent job on the assignments and tests in my courses.	.659		
12.	I think I can make sufficient effort that is required to learn in a course.	.703		
14.	Even if I am under time pressure, I can make an effort to succeed in a course.	.645		
25.	Considering the difficulty of the courses, the teacher, and my skills, I think I will do well in my academic tasks.	.600		
2.	I study naturally because the field of my study is very interesting to me.		.666	
15.	I am very interested in the content area of my courses.		.806	
17.	I believe that what I learn in a course can be used in practice.		.743	
18.	The specified schoolwork is mostly interesting for me.		.723	
20.	I think the material in the courses is generally useful for me to learn.		.738	
4.	I study because I want to learn something new.		.639	
16.	I don't often feel well while taking an exam. (r)			.698
24.	I often feel anxiety during the examination period of the semester. (r)			.743
10.	I feel my heart beating fast when I take an exam. (r)			.792
8.	Stage fright does not allow me to achieve appropriate performance in an exam. (r)			.733
5.	It is difficult for me to concentrate while taking an exam. (r)			.602
22.	I often cannot forget about my failed performance for a long time. (r)			.705
26.	I often feel that I do not understand anything at my course and therefore I cannot be successful in it. (r)			.645
Eigenvalue		6.399	4.353	2.070

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Cases included: 284. (r) = reversed items. * = items were translated from Czech for this table.

and varied between .55 (item 5) to .79 (items 15 and 10) and all the loadings were statistically significant ($p < .05$). When the modification index values were produced, it was stated that there was a notable relation between error covariances of item 1 with item 2. Covariance was not acceptable since the items were expected to exist in the different factors. However, when its standardized residual covariances matrices were checked, item 1 (with the value 3.294) from the *Academic self-efficacy* factor was deleted. In order to test the new model, CFA was used again.

According to the results of the second analysis, x^2 (df = 132, p = .000) = 259.929, x^2/df = 1.969 and their GOF indexes values RMR = .158, RMSEA = .059, CFI = .926, GFI = .910, AGFI = .884, PCLOSE = .090 pointed out the model fit at a satisfactory level. Nevertheless, when the standardized residual covariances matrices were considered, item 7 from the *Academic self-efficacy* factor was taken out of the model for its high value and the data were again re-analyzed.

The third CFA results were as x^2 (df = 116, p = .000) = 225,138, x^2/df = 1,941 and GOF indexes are as RMR = .151, RMSEA = .058, CFI = .933, GFI = .917, AGFI = .891, PCLOSE = .128. Those changes collectively improved the model fit and the values show that the tested model is coherent at a satisfactory level. The diagram regarding these results is shown in Figure 1.

On the other hand, in Table 4, reliability for the new model fit (consisting of 17 items) reached .778, demonstrating a moderate internal consistency. Taken together, the alphas and CFA suggest that the general model of motivational aspects of self-regulated learning with three factors is a reasonable representation of the data.

Table 4. Cronbach's alpha for the 17 items

Subscale	Academic self-efficacy	Task value	Test anxiety	Total
Number of items	4	6	7	17
Cronbach's alpha	0.759	0.842	0.842	0.778

The descriptive statistics and correlation of the MSLQ subscales are shown in Table 5. The highest mean score was determined in academic self-efficacy subscale (4.874; SD = .993), followed by task value (4.555; SD = 1.069) and test anxiety subscales (3.714; SD = 1.312). Considering these results, it can be said that the students had slightly above-average levels of motivation in the process of self-regulated learning. It refers to the students' conviction that they can successfully achieve at a designated level on an academic task that is perceived as interesting and useful for the practice with the students' reasonable level of task anxiety.

Figure 1. CFA results of the motivation subscale

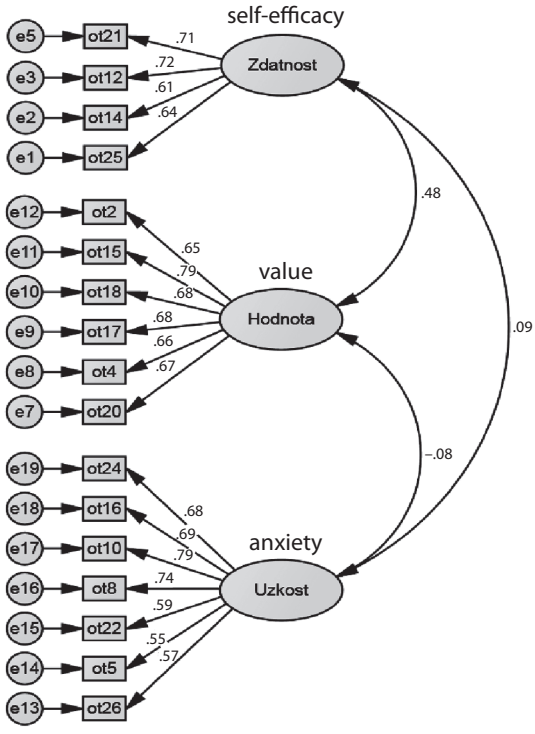

Table 5. Descriptive statistics and Pearson correlation coefficients between motivation subscales

Subscales	Mean	SD	Pearson coefficients		
			1	2	3
1. Academic self-efficacy	4.874	.993	1.000	.377*	.098
2. Task value	4.555	1.069		1.000	–.073
3. Test anxiety	3.714	1.312			1.000

Notes: $N = 284$ * = statistically significant at $p<.05$.

Correlations between the subscales range between .377 and –.073. The positive motivational factor academic self-efficacy is positively and significantly correlated with the task value subscale (r = .377). It shows that the students' scores in these subscales are interlinked. For instance, if one of the students' scores of academic

self-efficacy is high, task value scores of the same students are most likely high too, and vice versa. The results correspond to the theoretic model. The correlations between the other factors are under the significant level and are considered to be weak. For values of *r* below .160, correlation is too low to be meaningful.

4. Discussion

The adapted version of the MSLQ, called MoSU (*Dotazník motivačních strategií v učení*), appears to represent a useful, reliable, and valid means of assessing students' motivation for learning in the university context. The exploratory and confirmatory factor analyses results of the data were obtained from Czech sampling for university students of the Faculty of Humanities at Tomas Bata University in Zlín. The application was realized through a 284 (256 women and 28 men with average age 24, ranging from 19 to 29) data set. The possible generalizations based on this study are limited as the participants belong to the Czech educational environment.

It can be seen that 19 items of the adapted version of the MSLQ represent three latent factors underlying students' motivation in the process of self-regulated learning, explaining the 47% variance. Based on the CFA results items 1 and 7 were removed from the *Academic self-efficacy* factor. The GOF indexes improved as a result of their removal.

The results obtained at the end of the third CFA, $x^2/df = 1.941$ (being smaller than 3 shows that the model is acceptable). Of the GOF indexes, they are RMR = .151, RMSEA = .058. Being close to 0 of those values and even values equal to .05 show a very good fit (Roberts, 1999). In the model, GFI = .917 and AGFI = .891, means acceptable levels for the fit. The cases that GFI value is over .85 and AGFI value is over .80 are good fit (Anderson & Gerbing, 1984; Hoyle & Duvall, 2004). CFI = .933 which is the increasing GOF index is like this (being close to .90 can be said that there is an acceptable fit). PCLOSE = .128 value being greater than .05 is also an acceptable fit of the model.

Although it differs from the original number of factors the MSLQ questionnaire suggests that a 3-factor solution fits the best (i.e. those factors are underlying students' motivation in the process of self-regulated learning) into the Czech educational environment. The final version of the MoSU instrument is represented by 17 items. Factor 1 (F_1) *Academic self-efficacy* included 4 items, factor 2 (F_2) *Task value* included 6 items, factor 3 (F_3) *Test anxiety* included 7 items.

Due to its thematic focus, the research fits into the current national and international intention which seeks to find a new conception of education based on

the purposeful linking of theory and practice. Differences in various standards of students' motivation in the process of self-regulated learning according to one's gender, type of study, form of study, specialization and successfulness in one's studies will be further examined, as well as links among all the examined factors. In conclusion, the results can find an application in improving the organization, planning and evaluation of teaching in school and beyond.

References

Anderson, J.C., & Gerbing, D. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika, 49*(1), 155–173.

Boekaerts, M. (2002). *Motivation to learn*. Geneva: International Bureau of Education.

Boekarts, M., Musso, M., & Cascallar, E. (2012). Self-Regulated Learning and the Understanding of Comlex Outcomes. *Education Research International*. doi:10.1155/2012/686385.

Boruchovitch, E., & Ganda, D.R. (2013). Fostering self-regulated skills in an educational psychology course for Brazilian preservice teachers. *Journal of Cognitive Education and Psychology, 12*(2), 157–177.

Brandmo, C., & Berger, J.L. (2013). Fostering self-regulated learning: An introduction. *Journal of Cognitive Education and Psychology,* 12 (2), 127-137.

Deci, E.L., & Ryan, R.M. (2000a). Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67.

Deci, E.L., & Ryan, R.M. (2000b). Self-Determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78.

Hoyle, R.H., & Duvall, J.L. (2004). Determining the number of factors in exploratory and confirmatory factor analysis. In D. Kaplan (Ed.), *The SAGE Handbook of Quantitative Methodology for Social Sciences* (pp. 301-315). Thousand Oaks, CA: Sage.

Kohen, Z., & Kramarski, B. (2012). Developing Self-Regulation by Using Reflective Support in a Video-DigitalMicroteaching Environment. *Education Research International*. doi:10.1155/2012/105246.

Mareš, J. (1998). *Styly učení žáků a studentů.* Praha: Portál.

Pintrich, P.R. (2002). The role of metacognitive knowledge in learning, teaching, and assessing. *Theory Into Practice*, *41*(42), 219–226.

Pintrich, P.R. (Ed.). (1991). *A manual for the use of the Motivational strategies for learning questionnaire (MSLQ)*. Ann Arbor: University of Michigan, School of Education.

Roberts, J.K. (1999). *Basic concepts of confirmatory factor analysis*. Texas: Southwest Educational Research Association. ERIC database number: ED427091.

Schmitz, B., Klug, J., & Schmidt, M. (2011). Assessing self-regulated learning using diary measures with university students. in B. Zimmerman & D. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 251–266). New York: Routledge, Taylor & Francis Group.

Vávrová, S., Hladík, J., & Hrbáčková, K. (2012). The Determinants of Self-Regulated Learning Development in Students of Helping Professions. Procedia - Social and Behavioral Sciences, 69(1), 332–340.

Winne, P.H. (1995). Inherent details in self-regulated learning. *Educational Psychologist, 30*, 173–187.

Zimmerman, B.J. (2001). Theories of self-regulated learning and academic achievement: An overview and analysis. In B. J. Zimmerman, D. H. Shunk, (Eds.) *Self-regulated learning and academic achievement: Theoretical perspectives.* New Jersey: Lawrence Erlbaum Associates.

Zimmerman, B.J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, *41*(2), 64–70.

Zimmerman, B.J., & Manuel Martinez-Pons. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology, 82*(1), 51–59.