

Validation of the factor structure of the motivated strategies for learning questionnaire

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ABSTRACT

In recent years, the motivated strategies for learning questionnaire (MSLQ) has been used to assess students' motivational orientations and utilization of various learning strategies. Due to its significant effects on student outcomes such as academic performance and careers, research on the factor structure of motivated strategies for learning has received increasing attention. However, the existing literature indicates a dearth of studies focusing on the MSLQ dimensions in Vietnam. Therefore, this study aimed to ascertain the factor structure of the 31-item Student Motivation Scale (SMS), which is a subset of the larger 81-item MSLQ, in the context of Vietnam. The study utilized the Vietnamese version of the SMS to collect data from 317 high school students in Vietnam. The factorial analysis showed that the SMS has its original six-factor structure, which is made up of task value (TV), control beliefs, self-efficacy for learning and performance (SLP), test anxiety (TA), and intrinsic goal orientation (IGO). The present study recommended that school leaders and teachers should use the SMS to assess students' motivation in the context of Vietnamese education.

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1. INTRODUCTION

Motivation is a pivotal factor in bolstering students' levels of engagement, perseverance, and overall academic attainment [1]. The general education program 2018 in Vietnam [2] emphasizes the significance of fostering students' motivation in the learning process [3], [4]. Therefore, the education system seeks to foster an environment that promotes students' motivation to learn by recognizing it as a crucial factor [1]. Recognizing that driven students are more inclined to establish objectives, demonstrate initiative, and actively engage in their educational pursuits [5], the program emphasizes the importance of providing meaningful and relevant learning experiences that can inspire students and connect their learning to real-world applications. The program aims to foster students' motivation for exploration, inquiry, and necessary knowledge and skill acquisition.

In addition, the general education program 2018 encourages the implementation of diverse teaching strategies and instructional methods to cater to the diverse needs and interests of students [4], [6]. Educators can enhance student motivation by providing diverse learning opportunities and utilizing student-centered approaches that cater to individual strengths, learning styles, and personal goals [1], [5], [7], [8]. Hence,

conducting additional research on students' perceptions of their motivation holds significant value. Engaging in such an undertaking has the ability to enhance existing knowledge on this subject matter and promote the advancement of learning motivation, ultimately resulting in improved academic performance among students. Researchers have created a variety of assessment tools to evaluate students' motivation, aiming to gain a deeper understanding of their perspectives on motivation in the context of learning. Nevertheless, there is a scarcity of research investigating the reliability and validity of a motivation instrument, specifically within the high school setting in Vietnam. This information gap hinders educators' capacity to enhance student motivation. The present study examines the factor structure of the motivation scale of the motivated strategies for learning questionnaire (MSLQ) [9] in the Vietnamese high school context. The findings of this study would enhance the comprehension of Vietnamese high school students in terms of effective strategies for improving their motivation in the learning process.

Motivation refers to the processes that arouse, direct, and sustain an individual's behavior towards achieving a goal [10]. It involves the internal and external factors that drive and regulate human behavior. Motivation encompasses the reasons or incentives that propel individuals to engage in certain activities, make specific choices, and persist in their efforts to achieve desired outcomes [8], [11]. Pintrich *et al.* [9] proposed a self-regulated learning model that highlights the importance of motivation in the learning process. They suggest that learners who are motivated tend to set goals, monitor their progress, adopt effective strategies, and adapt their behavior when faced with challenges. Motivation plays a vital role in shaping individuals' engagement, persistence, and overall success in academic or task-related endeavors [1]. Motivation in the learning process refers to the internal and external factors that energize, direct, and sustain a learner's behavior and effort towards achieving educational goals [7].

Motivation in learning is essential because it influences learners' engagement, persistence, and overall academic performance [7], [10]. When students possess a high level of motivation, they are inclined to engage actively in the process of learning, establish ambitious objectives, and utilize efficient ways for acquiring knowledge. Motivated learners are willing to invest time and effort, and they exhibit a positive attitude towards learning. Motivation in the learning process can be influenced by various factors, including personal characteristics such as beliefs, values, and interests, as well as external factors like instructional methods, feedback, and the learning environment [12]. Students' sense of competence, autonomy, and relatedness also contribute to their motivation in the educational context. Effective educators recognize the importance of motivation in learning and strive to create a supportive and engaging learning environment. They utilize pedagogical approaches that facilitate the development of autonomy, mastery, and purpose, affording students the chance to establish objectives, exercise decision-making, and encounter a feeling of fulfillment.

In the process of learning, motivation has a significant impact on students' outcomes across various domains, including academic performance, learning engagement, and overall achievement [10], [11]. Motivated students tend to perform better academically. They are more likely to actively engage in learning activities, study effectively, and persist in the face of challenges. Motivation enhances students' focus, attention, and effort, leading to improved grades and test scores [13]–[15]. They show a higher level of interest, curiosity, and enthusiasm for learning. They are inclined to engage in classroom discourse, pose inquiries, and actively pursue supplementary materials, hence leading to a heightened comprehension of the subject matter [1]. Motivation influences students' willingness to put in effort and persist in their learning endeavors. Motivated students are more likely to set goals, work consistently, and overcome obstacles. They demonstrate resilience and are less likely to give up when faced with setbacks, leading to higher levels of achievement. Motivation contributes to the development of positive attitudes and mindsets towards learning [12]. Students view challenges as opportunities for growth and are more likely to adopt effective learning strategies. Motivation fosters self-regulated learning skills in students [10]. Motivated learners exhibit a sense of agency in their educational endeavors, assuming responsibility for their own learning process. They proactively establish objectives, diligently track their advancement, and flexibly adjust their approaches as circumstances dictate [1]. As a result, motivated students tend to perform better across various subjects and demonstrate a higher level of competence.

The general education program 2018 [2] highlights the necessity of a validated instrument to measure the motivation levels of high school students in Vietnam. Educators widely use the MSLQ as a tool to assess students' motivation in educational settings [9]. It aims to evaluate the motivation levels, cognitive and metacognitive techniques, and self-regulated learning behaviors of students within academic environments. The entire MSLQ or part of it is widely used in educational research studies across different countries [11], [12], [16]–[18] and has been influential in understanding the motivational and strategic aspects of student learning [19], [20]. There are two distinct scales in the MSLQ [9]. The learning strategy scale assesses three main constructs: i) cognitive strategies (rehearsal, elaboration, organization, and critical thinking); ii) metacognitive strategies (self-regulation); and iii) resource management strategies (time and

study environment, effort regulation, peer learning, and help seeking). The Student Motivation Scale (SMS) assesses three main constructs: i) values (intrinsic goal orientation/IGO), extrinsic goal orientation/EGO, and task value/TV); ii) expectancy beliefs (control of learning beliefs/CLB, self-efficacy for learning and performance/SLP); and iii) test anxiety (TA).

Intrinsic goal orientation refers to a student's internal drive and willingness to engage in a task or activity, reflecting their motivation [7], [10]. It is characterized by the student's genuine interest, curiosity, and enjoyment of the task itself rather than external rewards or pressures. EGO focuses on the external factors that drive a student's willingness to participate in a task or activity [7]. It pertains to the extent to which external incentives, such as grades, prizes, evaluations, or examinations, drive students. Task value refers to a student's perception and evaluation of the attractiveness, importance, and usefulness of a learning task or academic activity [1], [7], [10], [12]. It encompasses the subjective appraisal of the benefits, relevance, and personal significance that a task holds for the student. TV is an important component of motivation as it influences students' engagement, effort, and persistence in completing the task.

Control of learning beliefs refers to the expectations and beliefs held by students about their ability to exert control and influence over their learning outcomes through their personal efforts and strategic approaches [8], [10], [21]. It reflects their beliefs about the effectiveness of their actions and the influence of external factors on their learning success. SLP refers to an individual's belief in their own capability to learn effectively and perform well on assigned tasks within a shared project [7], [9], [10]. It is a specific form of self-efficacy that relates to academic and task-related activities within a collaborative or group setting. SLP has a significant impact on students' motivation, engagement, and achievement in collaborative projects.

Test anxiety refers to the experience of negative thoughts, worry, and physiological arousal that can disrupt performance and hinder the learning process [1], [10]. It is a common emotional response that students may experience when facing academic challenges, evaluations, or demanding tasks. Anxiety often involves negative thoughts and cognitive distortions that can interfere with learning and performance.

The MSLQ has shown promise as a tool for assessing students' motivation in educational domains [20]. The researchers conducted analyses to examine the factor structure, reliability, and validity of the MSLQ in various contexts. Pintrich *et al.* [9] conducted the initial validation study of the MSLQ with a sample of American students. The study found that the SMS had a six-factor structure and the learning strategies scale had a nine-factor structure, as determined by exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The scales demonstrated high internal consistency (ranging from 0.62 to 0.93). Subsequent research undertaken with other cohorts of students in the United States has provided more validation for the aforementioned findings [17], [22], Turkey [16], Mexico [23], Colombia [24], and Singapore [20], [25].

Chen and Whitesel [17] conducted a study to assess the validity and reliability of a modified version of the MSLQ, specifically designed for evaluating computer software learning processes. The participants completed the revised MSLQ, which consisted of multiple scales measuring different dimensions of motivation and learning strategies in the context of computer software learning. The researchers examined the factor structure of the questionnaire, evaluated the internal consistency of its scales, and explored the relationships between different dimensions of motivation and learning strategies. The findings of the study indicated satisfactory psychometric properties of the revised MSLQ for assessing computer software learning strategies. The factor analysis revealed a coherent factor structure, and the internal consistency reliability analysis demonstrated acceptable reliability coefficients for the questionnaire scales. The correlation analysis provided evidence of the relationships between motivation and learning strategy factors within the context of computer software learning in the United States. Cho and Summers [22] conducted a study that utilized CFA to assess the factor validity of the MSLQ inside the asynchronous online learning environment in the United States. The study's results revealed that the MSLQ's factor structure exhibited a satisfactory fit within the context of asynchronous online learning. The CFA analysis results showed that the MSLQ variables are a good way to measure motivation and learning styles in online education. The results indicate that the MSLQ has the potential to serve as a dependable instrument for evaluating motivation and learning techniques in online educational settings.

Ramírez-Dorantes *et al.* [23] assessed the validity and reliability of the MSLQ within the specific setting of Mexican universities. The psychometric properties of the MSLQ were evaluated by the researchers through the utilization of several statistical procedures, such as EFA, CFA, and reliability analysis. EFA was employed to investigate the latent factor structure of the questionnaire, while CFA assessed the adequacy of the factor structure in relation to the collected data. Reliability analysis evaluated the internal consistency of the MSLQ. The results of the study offered evidence in favor of the validity and reliability of the MSLQ when used with university students in Mexico. The results of EFA and CFA provided empirical support for the factor structure of the MSLQ. These findings suggested that the MSLQ was successful in accurately assessing the intended constructs within the particular population under investigation. The results of the reliability analysis indicated that the MSLQ exhibited acceptable levels of internal consistency. The results of

this study provided evidence for the suitability of the MSLQ in evaluating motivation and learning methods among university students in Mexico. In addition, Ramirez-Echeverry *et al.* [24] focused on the process of adapting and validating the MSLQ for engineering students in Colombia. The researchers employed EFA to investigate the latent factor structure of the questionnaire and utilized CFA to assess the goodness-of-fit between the factor structure and the collected data. The results of the study confirmed the effective adaptation and validation of the MSLQ for engineering students in Colombia. The results obtained from EFA and CFA provided confirmation of the factor structure of the modified MSLQ. These findings indicated that the scales utilized in the questionnaire effectively assessed the desired components among the population of engineering students in Colombia. The reliability analysis yielded findings that supported the notion of acceptable internal consistency for the scales of the MSLQ.

Chow and Chapman [20] conducted a study to validate the MSLQ within the specific context of a high school environment in Singapore. Researchers administered the MSLQ to the participants, encompassing measures that assessed diverse aspects of motivation and learning processes. The study used various statistical studies, such as factor analysis and reliability analysis, in order to evaluate the construct validity and reliability of the MSLQ. Factor analysis was employed to investigate the latent factor structure of the questionnaire, while reliability analysis was conducted to evaluate the internal consistency of the scales. The results of the investigation provided evidence for the construct validity and reliability of the MSLQ in a sample of high school students from Singapore. The results of the factor analysis provided confirmation of the factor structure of the MSLQ, suggesting that the scales successfully assessed the targeted constructs within the particular population under study. The results of the reliability analysis indicated that the MSLQ exhibited acceptable levels of internal consistency. Moreover, Rotgans and Schmidt [25] provided an overview and evaluation of the MSLQ and discussed the background and development of the MSLQ, highlighting its theoretical foundations and the dimensions it covers. The authors discuss the psychometric properties of the MSLQ, including its reliability and validity. They also provide insights into the application and usefulness of the MSLQ in different educational contexts. The study concludes that the MSLQ is a valuable tool for assessing students' motivational beliefs and learning strategies. It offers a comprehensive framework for understanding the various factors that influence students' engagement and approaches to learning.

Overall, the findings of recent studies contribute to the literature by providing evidence of the construct validity and reliability of the MSLQ in the context of high school students in different countries. The findings provide evidence for the validity and utility of the MSLQ in evaluating the motivation and learning strategies of high school students. These findings offer valuable insights into the various aspects that impact their level of involvement and their approaches to the learning process.

The SMS of the MSLQ has demonstrated efficacy in assessing student motivation in diverse educational settings. Existing research on the SMS has mainly concentrated on Western educational settings, creating a notable gap in the literature regarding its factor structure in non-Western contexts, such as Vietnamese high schools. The present study aims to examine the factor structure of the SMS of the MSLQ in the Vietnamese context of education in order to enhance our understanding of students' motivational perceptions in diverse cultural and educational settings. This study was conducted to answer a primary research question: what is the factor structure of the SMS of the MSLQ in the Vietnamese context of education?

2. RESEARCH METHOD

2.1. Research design

The present study employed a quantitative methodology to examine the factor structure of the SMS within the educational framework of Vietnam, specifically targeting the population of high school students. We collected data using the SMS of the MSLQ. Both EFA and CFA were employed in order to examine and substantiate the structural model of the SMS.

2.2. Participants

The present study utilized the formula $n = N / (1 + N * e^2)$ to determine the sample size [26]. In this equation, N represents the population size, n indicates the desired sample size, and e signifies the margin of error. The sample size was determined at a 95% confidence level. Therefore, we drew a sample of 317 year 12 students (n) from a total population of 1,800 students (N) across 27 high schools in An Giang Province, Vietnam. The average age of the participants was 17.60 years ($SD=7.65$). Female participants had an average age of 17.01 years ($SD=07.16$), while male participants had an average age of 17.03 years ($SD=07.68$). Participation in the study was entirely optional, and the response rate was astonishingly high, reaching 97% when participants were asked to complete the questionnaire. All responses from the SMS were kept

anonymous to protect the confidentiality and anonymity of the respondents. The high response rate and anonymous data collection process contributed to minimizing potential biases and enhancing the reliability of the study's findings.

2.3. Instruments

The MSLQ, a well-recognized and frequently utilized tool in educational research, assesses students' motivation, learning strategies, and related factors. It is known for its consistency, stability over time, and excellent reliability, with a high coefficient alpha across diverse participant groups [11], [23], [24]. Thus, this study utilized the 31-item SMS of the MSLQ to collect data [21]. Two bilingual instructors with extensive teaching experience independently translated the scale into Vietnamese. The SMS consisted of 31 items, organized into six subscales. The first subscale, IGO, comprised 4 items, measuring preferences for challenging and curiosity-arousing course material (e.g., "In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn"). The second subscale, EGO, contained 4 items assessing the desire for academic achievement compared to peers ("If I can, I want to get better grades in this class than most of the other students"). The third subscale, TV, consisted of 6 items exploring the perceived usefulness of the course material for learning (e.g., "I think the course material in this class is useful for me to learn"). The fourth subscale, CLP, included 4 items, investigating students' beliefs about their control over their learning success (e.g., "If I don't understand the course material, it is because I didn't try hard enough"). The fifth subscale, SLP, consisted of 8 items, gauging students' confidence in understanding complex course content (e.g., "I am confident I can understand the most complex material presented by the instructor in this course"). The final subscale, TA, contained 5 items, measuring the intensity of anxiety experienced during exams (e.g., "I feel my heart beating fast when I take an exam"). Participants responded to the items using a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). The participants were instructed to complete the questionnaire within approximately 20 minutes. By using this adapted SMS instrument in Vietnamese, the study aimed to assess various aspects of the motivation of Vietnamese high school students.

2.4. Data analyses

An analysis was conducted to evaluate the internal consistency of the five components of the SMS before conducting EFA and CFA to examine the factor structure of the motivation scale of the MSLQ. The initial analysis employed principal-axis factoring with varimax rotation to investigate the potential factor structure of the scale. The study utilized several indicators, including the Kaiser-Meyer-Olkin (KMO) measure ($0.50 < \text{KMO} < 1$), Bartlett's test ($p < 0.05$), factor loading (> 0.50), and eigenvalue (> 1). CFA was later utilized to assess and confirm the underlying structural validity of the model. We assessed the model fit using the chi-square/degrees of freedom ratio ($\chi^2/\text{df} \leq 3$) [27], the goodness-of-fit index ($\text{GFI} \geq 0.90$), the comparative fit index ($\text{CFI} \geq 0.90$), the Tucker-Lewis index ($\text{TLI} \geq 0.90$) [28], and the root mean square error of approximation ($\text{RMSEA} \leq 0.08$) [29]. The minimum acceptable value for the Cronbach's alpha coefficient is 0.70 [30], while the corrected item-total correlation should be at least 0.30 [28]. We established the minimum threshold for the correlation coefficient (r) among factors of the instrument as $r \geq 0.05$. A significance level of $p = 0.01$ was used to determine the alpha level.

3. RESULTS AND DISCUSSION

We analyzed the students' responses to the six components of the SMS to evaluate internal consistency. Based on Cronbach's alpha coefficients, it was recommended to remove five items: item 4 (I think I will be able to use what I learn in this course in other courses); item 6 (I'm certain I can understand the most difficult material presented in the readings for this course); item 28 (I feel my heart beating fast when I take an exam); item 29 (I'm certain I can master the skills being taught in this class); and item 31 (Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class) from the 31-item scale due to their low item-total correlations (< 0.30). After removing five items, we utilized a total of 26 items from the six subscales for EFA with principal-axis factoring and varimax rotation. We determined the suitability of the 26-item scale for factor analysis by using the KMO measure ($\text{KMO} = 0.88$) and Bartlett's test of sphericity ($\chi^2(780) = 5877.64$, $p < 0.000$) [30]. EFA yielded a six-factor solution, where each factor had eigenvalues exceeding 1. These factors collectively accounted for 55.71% of the total variance. The majority of items exhibited satisfactory performance across all six original subscales. The loadings of item 5 from the self-confidence and belief for learning and performance (SLP) factor (I believe I will receive an excellent grade in this class) and item 27 from the TA factor (Understanding the subject matter of this course is very important to me) were below 0.50. As a result, we subsequently excluded these two items from the scale.

Table 1 presents the means and standard deviations of the six components of the SMS. The means ranged from 3.04 to 3.36, with corresponding standard deviations between 0.55 and 0.65. These values

provide insights into the central tendencies and variations within each component, reflecting the participants' perceptions of motivation in the context of their high school education. Furthermore, the adjusted item-total correlation values for all items exceeded 0.40, as indicated by Hu and Bentler [28]. This finding suggests that each item of the SMS demonstrates strong discriminant ability, effectively distinguishing between different levels of motivation within each component. The validity and reliability of the SMS in measuring motivation among Vietnamese high school students are improved by a higher adjusted item-total correlation value. This means that the item is making a big difference in measuring the underlying construct. These statistical measures support the robustness of the SMS as a reliable instrument for evaluating the various aspects of motivation in the educational context of Vietnamese high school students. The means and standard deviations provide a snapshot of the students' motivational perceptions, while the strong item-total correlations validate the discriminant power of each item in measuring its respective construct within the SMS.

Table 1. Means, standard deviations, Cronbach's alpha (α), and inter-factor correlations

	No. of items	M	SD	α	SMS	IGO	EGO	TV	CLB	SLP	TA
SMS	24	3.32	0.55	0.79	1	0.58**	0.58**	0.53**	0.64**	0.48**	0.80**
IGO	4	3.31	0.57	0.81		1	0.19**	0.19**	0.25**	0.15*	0.41**
EGO	4	3.04	0.58	0.80			1	0.18**	0.25**	0.20**	0.45**
TV	4	3.23	0.59	0.76				1	0.27**	0.11*	0.40**
CLB	4	3.36	0.60	0.82					1	0.26**	0.45**
SLP	4	3.35	0.58	0.78						1	0.37**
TA	4	3.32	0.65	0.83							1

Note: N=317, * $p < 0.05$, and ** $p < 0.01$

The results indicate that the alpha reliabilities of the six subscales of the SMS showed satisfactory levels of internal consistency, with values ranging from 0.76 to 0.83. Specifically, the Cronbach's alpha values were 0.81 for IGO, 0.80 for EGO, 0.76 for TV, 0.82 for CLB, 0.78 for SLP, and 0.83 for TA. These high alpha values indicate that the SMS and its subscales consistently measure the underlying constructs in a reliable manner [29]. Moreover, the SMS and its subscales demonstrated moderate correlations, ranging from 0.53 to 0.80 ($p < 0.01$), which confirms their strong convergent validity. The moderate correlation coefficients indicate that the SMS and its subscales can effectively predict and measure students' motivation in the Vietnamese high school context. Additionally, the moderate correlation coefficients between the six subscales ranged from 0.11 to 0.45, providing further evidence of their distinctiveness and supporting the original six-factor structure of the SMS for Vietnamese students. The consistency of the item-total correlations and the internal consistency of the six subscales with previous studies [18], [21], [23], [24], [31] demonstrate the robustness of the SMS and its subscales. These findings further reinforce the credibility and generalizability of the SMS as a valid and reliable tool for assessing motivation across different cultural and educational settings, including Vietnam.

Table 2 summarizes the results of the EFA analyses. EFA explored the 24-item scale's potential factor structure. The present study assessed the suitability of the factor analysis by using the KMO measure and Bartlett's test of sphericity. A KMO value close to 1 indicates that the data are highly suitable for factor analysis. In this case, the KMO value of 0.87 suggests that the data provided a good fit for the factor analysis, indicating that the variables had a sufficient degree of intercorrelation to proceed with the analysis. Bartlett's test of sphericity ($\chi^2_{(276)} = 2832.28$, $p < 0.000$) indicates that the variables are suitable for factor analysis. The obtained extremely low p-value ($p < 0.000$) in this study confirms the appropriateness of the factor analysis by indicating a significant difference between the correlation matrix and the identity matrix. A six-factor solution was revealed by the EFA results, indicating that the 24 items of the SMS can be grouped into six distinct dimensions based on their intercorrelations. These six factors accounted for 56.46% of the total variance, indicating that they explain a significant portion of the variability in the original items. The factor loadings represent the strength of association between each item and the underlying factor. Factor loadings range from 0 to 1, with higher values indicating a stronger association. In this study, factor loadings ranged from 0.53 to 0.78, which indicates substantial associations between the items and their respective factors.

The six factors identified were: IGO comprised four items from the SLEQ, and each item had factor loadings ranging from 0.71 to 0.77; EGO consisted of four items with factor loadings ranging from 0.70 to 0.75; TA included four items with factor loadings ranging from 0.66 to 0.74; CLB encompassed four items with factor loadings ranging from 0.63 to 0.75; SLP comprised four items with factor loadings ranging from 0.67 to 0.71; and TA included four items with factor loadings ranging from 0.53 to 0.67.

Table 2. EFA of the SMS

	Items	Mean	SD	Factor loadings					
				IGO	EGO	TV	CLB	SLP	TA
1	In a class like this, I prefer course material that really challenges me, so I can learn new things (IGO1).	3.30	0.69	0.77					
16	In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn (IGO2).	3.32	.074	0.73					
22	The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible (IGO3).	3.35	0.70	0.72					
24	When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade (IGO4).	3.29	0.74	0.71					
7	Getting a good grade in this class is the most satisfying thing for me right now (EGO1).	2.69	0.67		0.75				
11	The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade (EGO2).	2.82	0.68		0.73				
13	If I can, I want to get better grades in this class than most of the other students (EGO3).	3.33	0.70		0.73				
30	I want to do well in this class because it is important to show my ability to my family, friends, employer, or others (EGO4).	3.33	0.74		0.70				
10	It is important for me to learn the course material in this class (TV1).	3.37	0.76			0.74			
17	I am very interested in the content area of this course (TV2).	2.86	0.71			0.73			
23	I think the course material in this class is useful for me to learn (TV3).	3.30	0.70			0.73			
26	I like the subject matter of this course (TV4).	3.41	0.68			0.66			
2	If I study in appropriate ways, then I will be able to learn the material in this course (CLB1).	3.41	0.77				0.75		
9	It is my own fault if I don't learn the material in this course (CLB2).	3.37	0.71				0.70		
18	If I try hard enough, then I will understand the course material (CLB3).	3.35	0.74				0.67		
25	If I don't understand the course material, it is because I didn't try hard enough (CLB4).	3.32	0.70				0.63		
12	I'm confident I can understand the basic concepts taught in this course (SLP1).	3.38	0.74					0.71	
15	I'm confident I can understand the most complex material presented by the instructor in this course (SLP2).	3.37	0.75					0.70	
20	I'm confident I can do an excellent job on the assignments and tests in this course (SLP3).	3.24	0.78					0.69	
21	I expect to do well in this class (SLP4).	3.43	0.68					0.67	
3	When I take a test, I think about how poorly I am doing compared with other students (TA1).	3.30	0.78						0.67
8	When I take a test I think about items on other parts of the test I can't answer (TA2).	3.34	0.81						0.64
14	When I take tests I think of the consequences of failing (TA3).	3.30	0.77						0.56
19	I have an uneasy, upset feeling when I take an exam (TA4)."	3.37	0.81						0.53
	Eigenvalue			6.59	2.41	2.13	2.09	1.82	1.08
	Cum %			25.69	33.95	41.03	47.86	53.66	56.46

Note: factor loadings <0.50 were omitted.

The findings of this study were consistent with previous research, as the identified six factors aligned with those found in earlier studies examining the SMS. The robustness and replicability of the six-factor solution for the SMS of the MSLQ across different samples and contexts is suggested. The use of principal-axis factoring and varimax rotation allowed the study to uncover meaningful dimensions of student learning engagement, providing valuable insights into the underlying motivational factors affecting students' approaches to learning. These results can inform the development of targeted interventions and support strategies to enhance student motivation and engagement, ultimately leading to improved learning outcomes.

Next, we applied CFA to a 20-item SMS to determine if the data supports the proposed six-factor structure, as originally suggested by Pintrich *et al.* [9]. The CFA findings for the 20 items confirmed the same six-factor structure of the SMS as initially proposed by Pintrich *et al.* [9]. The model exhibited favorable fit indices: $\chi^2=215.7$, $df=237$, $\chi^2/df=0.91$, $p=0.000$, $TLI=1.009$, $CFI=1.000$, and $RMSEA=0.000$ [30]. The favorable fit indices of the model suggest that the six-factor structure effectively explains the

underlying motivation measured by the SMS. In other words, the proposed six dimensions of SMS (as represented by the six subscales) are well supported by the observed data. The standardized estimates for the factor loadings of all six subscales varied between 0.68 and 0.81. Factor loadings represent the strength of the relationship between each item and its respective factor. In this study, the factor loadings were quite high, indicating substantial associations between the items and their underlying factors. Higher factor loadings suggest that the items are well-representative of their corresponding motivational factors. Figure 1 illustrates the hypothesized six-factor structure of the SMS and how each item loads onto its respective factor.

The main objective of this research was to examine the factor structure of the SMS of the MSLQ, adapted for the Vietnamese high school setting. EFA produced consistent results, exposing a six-factor solution that corresponded to the six factors identified by Pintrich [9]. This demonstrated the configurational equivalence of the SMS in Vietnamese high schools. Next, we conducted CFA to assess the compatibility of the model with the collected data, and the results confirmed the six-factor, 20-item structure for the SMS among Vietnamese students. The fit indices indicate that the six-factor model demonstrated a satisfactory match for the cohort of Vietnamese high school students. The present study's findings align with recent studies [16], [17], [20], [22], [23], [25] that confirmed the 6-factor structure of the SMS. The SMS effectively contributes to research on motivation during the learning process, regardless of cultural context. In addition, the SMS demonstrated adequate predictive and convergent validity, and the correlations between the six subscales were appropriate for the student population in Vietnam. These results indicate that the SMS is a reliable and valid instrument for measuring students' motivation in their learning experiences.

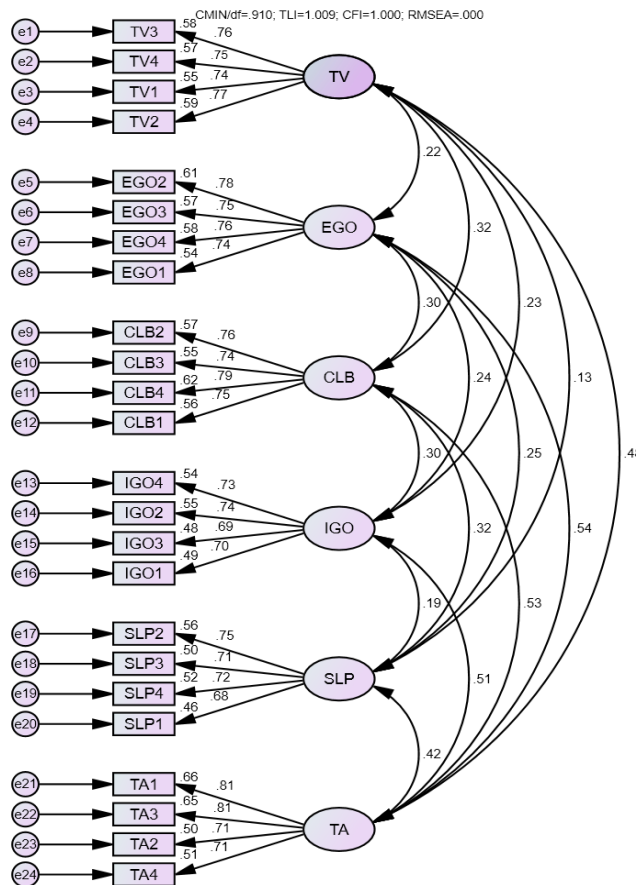


Figure 1. The best fit model of the SMS

Findings from this study support the notion that motivation is a universal concept that is consistently observable and measurable across diverse cultural contexts. The study confirms that the well-established conceptual framework proposed by Pintrich *et al.* [9] aligns with the consistent structure of the SMS in the Vietnamese context. This concordance suggests that the fundamental dimensions of motivation are consistent and applicable across nations and educational settings. The SMS, a widely used instrument, assesses the intended constructs effectively and provides reliable and valid results. These findings add to the growing

body of evidence supporting Pintrich *et al.* [9] conceptual framework, bolstering its generalizability and robustness. The close alignment facilitates effective use of the SMS in Vietnamese high schools to assess and cultivate students' motivation, thereby facilitating knowledge exchange and enhancing educational effectiveness. The study's close adherence to the conceptual framework in the context of a Vietnamese high school provides empirical support for the universality and validity of motivation theory across disparate cultural and educational contexts.

4. CONCLUSION

This study offers strong empirical evidence in favor of the initial six-factor model of the SMS as part of the MSLQ in the educational setting of Vietnam. Notwithstanding the removal of seven items from the initial scale, the current study offers robust evidence in favor of the original six-factor structure of the SMS within the educational setting of Vietnam. The cultural and social circumstances of the study population may have influenced the exclusion of certain items from the study. Notably, this study represents the first confirmation of the SMS among Vietnamese students. The results provide robust evidence for the suitability of the six-factor model of the SMS in the Vietnamese educational setting. This model encompasses IGO, EGO, TV, CLB, SLP, and TA. This study emphasizes the robust internal consistency of the 24-item SMS within the Vietnamese context, despite the scarcity of research on the SMS in other contexts.

The results suggest that Vietnamese students share similar cultural practices, beliefs, and educational values, which supports the use of the SMS to evaluate students' motivation in Vietnam and broadens the scale's applicability. This research offers a potentially effective and comprehensive survey instrument for assessing students' motivation, which can be of great benefit to schools. The adaptation of this instrument is anticipated to generate interest not only for additional studies and theories on student learning motivation in Vietnam but also as a valuable tool for institutions seeking to foster motivational development. However, it is crucial to recognize the study's limitations to ensure a balanced interpretation of the results. One potential limitation is the use of a convenience sample in the research process. By relying on data collected from students who were readily available, the study may not fully represent the broader student population in Vietnam. To improve the external validity of future investigations, researchers should consider employing randomized samples that better reflect the diversity of students across different educational institutions and backgrounds. Another aspect that deserves attention is the scarcity of previous studies exploring the factor structure of the SMS in the context of Vietnam. Given the unique cultural and educational characteristics of the country, it is vital to validate the SMS's factor structure within this specific context. To achieve this, future research should aim to incorporate a more diverse sample of Vietnamese students from various secondary and higher education institutions.




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