International Research Journal of Multidisciplinary Scope (IRJMS), 2025; 6(2): 127-140

Original Article | ISSN (0): 2582-631X

DOI: 10.47857/irjms.2025.v06i02.03447

# Revalidating the Learning Strategies Dimension of the MSLQ: An Exploratory and Confirmatory Factor Analysis

Muhammad Kamran<sup>1</sup>, Amjad Islam Amjad<sup>2</sup>, Arfa Mubeen<sup>3</sup>, Sohni Siddiqui<sup>4</sup>,

Sarfraz Aslam<sup>5\*</sup>, Shumaila Mansha<sup>6</sup>

<sup>1</sup>Department of Education, University of Loralai, Balochistan, Pakistan, <sup>2</sup>School of Education Department, Government of Punjab, Kasur, Pakistan, <sup>3</sup>National Institute of Psychology, Quaid-i-Azam University, Islamabad, Pakistan, <sup>4</sup>Institute for Educational Research (IfB), Bergische Universität Wuppertal, Wuppertal, NRW, Germany, <sup>5</sup>Faculty of Education and Humanities, UNITAR International University, Petaling Jaya, Malaysia, <sup>6</sup>Institute of Education and Research, University of the Punjab, Lahore, Pakistan. \*Corresponding Author's Email: sarfraz.aslam@unitar.my

#### Abstract

The Motivated Strategies for Learning Questionnaire (MSLQ) is the most vigorous scale that assesses self-regulated learning (SRL) strategies. The MSLQ is a detailed scale of 81 items with two major dimensions (i.e., the Motivation Dimension (MD) and the Learning Strategies (LS). Each major dimension has again sub-scales. However, its validation is a topic of debate for research experts. Previous researchers determined insufficient evidence to support the 81-item version of the MSLQ theoretical framework. The present research aims to revalidate the brief version of the LS dimension within a distinct Pakistani university student setting (N = 811). The researchers also sought to understand how demographics affect different motivational strategies. This process aimed to derive a condensed version of the LS dimension, intending to dissuade researchers from employing the more extended version in Pakistan. In this study, researchers replicated the previous studies to conduct exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on the LS Dimension of the brief version of MSLQ using SPSS 27 and AMOS 20. The results indicate that the brief scale version aligns effectively with the model's five factors (elaboration, rehearsal, critical thinking, organization, and peer learning), affirming its suitability for use in this novel context. The results also indicate that there were no significant differences between male and female students from different regions and public or private universities in terms of employing strategies. However, it was found that research students use cognitive LS, like thinking critically and elaborating, more than other factors.

Keywords: Confirmatory Factor Analysis, Learning Strategies, Psychometric Validation, Revalidation of MSLQ.

# Introduction

Research into student motivation addresses the complex and multifaceted aspects of education. Understanding what motivates students to engage, persist, and excel in their academic pursuits is a fundamental concern in education. These studies aim to uncover the various factors, both internal and external, that influence student motivation. Motivation and learning strategies (LS) are associated with learning, and motivation influences readiness to acquire knowledge (1, 2). Students who are highly involved in their studies are naturally motivated to learn because they find the learning process essential, intriguing, and beneficial (3). Students who believe their academic performance depends on their efforts and trust in their ability to do well are more likely to engage in deep learning (4). A study emphasized the importance of student motivation and recognized

that motivation is susceptible to various influences, including external rewards, personal beliefs, individual aspirations, and interests (5). Consequently, tailoring educational approaches and LS to students' personal beliefs can enhance their academic motivation and performance. Pakistan possesses the lowest literacy rate globally and a high dropout rate (6, 7). Understanding the key motivational factors that can be harnessed to improve LS, engage students in improved academic performance, and ultimately increase the country's literacy rate is paramount. While various instruments have been used to measure student motivation and LS in the Pakistani context, there is an urgent need to validate the widely used and reliable Motivated Strategies for Learning Questionnaire (MSLQ) for its appropriateness in the Pakistani context (8). The MSLQ has constantly

This is an Open Access article distributed under the terms of the Creative Commons Attribution CC BY license (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited.

(Received 08th December 2024; Accepted 09th April 2025; Published 28th April 2025)

attracted the attention of academics from the time it was constructed by principal investigators and is widely used among researchers around the globe in numerous research studies about SRL (9, 10). The original MSLQ (total 81 items) comprises two major dimensions: Motivation and Learning Strategies (LS). The motivation dimension had six sub-dimensions, while the LS dimension had nine sub-dimensions. The nine sub-scales of the LS dimension are rehearsal, elaboration, organization, critical thinking, metacognitive selfstudy regulation, time and environment management, effort regulation, peer learning, and help-seeking (11, 12). In the LS major dimension, the first four components, rehearsal, elaboration, organization, and critical thinking, represent cognitive LS. Cognitive strategies combine simple and sophisticated LS (9). Cognitive approaches such as topic selection, organization, and elaboration facilitate students' ability to analyze and understand course material (13). Cognitive strategies help integrate newly acquired information with previously acquired knowledge (14). The fifth represents the subscale metacognitive self-regulation learning strategy. In the LS dimension, there is only one metacognitive self-regulation learning strategy, which includes complex processes like planning, monitoring, and

cognitive regulation of the learning material that requires higher-order thinking (15-17). Goalsetting, strategy coordination, process monitoring, and strategy adaptation are all examples of metacognitive operations that can help students learn more effectively in various circumstances and with varying degrees of success (18). Students who develop metacognition are better equipped to manage their learning (19). The last four subscales represent the resource management strategy (16, 20). Study time, socialization opportunities, and peer support are all resources that can be addressed to optimize academic performance (21). Careful management of these resources enhances achievement in cognitive and meta-cognitive learning processes (22). All major MSLQ scales and subscales can be independently adopted and administered for data collection (16). Since the current study's researchers are only interested in the LS section of the MSLQ, the Motivation section will not be discussed now. All subscales of the LS section had reasonable internal consistency and reliability values, even though some subscales had fewer items (23). In this study, we employed a shortened edition of MSLQ LS, aiming to revalidate it in the context of Pakistan's educational system for assessing students' LS (9).



Figure 1: Study Model-Revalidation of Learning Strategies from Condensed Model of MSLQ

This decision was based on the instrument's recent successful revalidation in other middle-and lowincome countries, leading to the assumption that this version will be similarly effective in the Pakistani region. The current study focuses on the psychometric examination of the LS part of the MSLQ. Considering the previous conditions, it is crucial to determine the most persistent aspects and obtain a condensed form of the LS part that retains the most pertinent tactics for Pakistani university students (24). This version is supposed to function as a means of demonstrating the validity of new demographics. The motivation for the desire to create a shortened version is to decrease the time it takes to complete the application. In reality, instruments are not used independently but as part of a more extensive collection of tools. Therefore, shortening the version would help decrease the time required to complete the application and alleviate the fatigue experienced by individuals who go through it (25). The research model is presented in Figure 1.

### Validation Issues Reported by Researchers from Different Regions

Several studies have examined the MSLQ in various countries and languages, including validation studies (9, 26-33). However, some of these studies critically examined the instrument itself. In particular, after analyzing its latent structure, there is insufficient evidence to support the theoretical structure of the 81-item MSLO version (34). Researchers had to delete more than half of the subscales to re-specify the model, as replicating the original theoretical model was difficult. Psychometric issues were mainly reported in the LS section (10, 35). Similarly, another study validated the original 81 MSLQ items in South America. The participants in the study were 258 minority students of STEM courses at North Carolina University (29). The researcher applied descriptive analysis and CFA to measure the reliability and psychometric properties of the original MSLQ. Due to unsatisfactory model fit findings, the factorial structure was pre-specified using CFA methods to account for the observed data. The MSLQ-R shows considerable ability to distinguish based on academic performance. In continuation, another study tried to validate the original MSLQ version in India. The study's respondents were 1929 university students from various disciplines in the Punjab state of India.

After analysis, researchers deleted two subscales and five items from the original MSLQ. The adopted MSLQ-India had 31 motivation items and 45 LS. Furthermore, researchers did not claim that the MSLQ-India was generalizable due to cultural and contextual differences (36). Similarly, a metaanalytic review investigated whether MSLQ could predict academic performance. They identified ten problematic items with conditional content where statements focused on events' occurrences and reactions to them simultaneously or separately; one example was Item 68: "I ask a fellow student in this class for assistance when I cannot understand the material in this course." Researchers have found eight ideal-point items that all students respond to similarly, regardless of their academic performance. However, typical students tend to respond in different ways. For instance, item 58, "I ask the teacher to elaborate on ideas I do not fully understand," causes disagreement between students with high and low academic performance for various reasons. The authors suggest that such items could explain some of the validity issues faced by using this instrument. Another psychometric issue identified was a high degree of redundancy at the measure level. Strong relationships between specific subscale pairs may indicate that they measure the same construct, as seen in the case of time management and learning environment (p = .92) and peer learning and helpseeking (p=.95). Thus, they recommend either rewording or combining these subscales (35). Researchers from the Chile region reported a similar issue. A study in Chilean college students' structure and dependability using MSLQ, but encountered challenges replicating its original particularly in the factorial structure, Metacognitive Self-Regulation section. Organization, Critical Thinking, Help-seeking, and Peer Learning subscales were independent subscales. In contrast, Management of the Study Environment, Time, and effort were partially replicated. The authors speculate that differences could be attributed to participant characteristics (30). Similarly, the validity evidence from the scale and its psychometric properties were not well established for metacognition self-regulation measures (37). Another study highlighted the problem of insufficient evidence to support the theoretical classification of the four domains of regulation: cognition, behavior, motivation, and context. The authors investigated the interrelationship between these areas to determine if they are distinct or represent a broad display of self-regulation (38).

# Validity and Reliability of Translated and Shorter Versions

The modification in the model was observed in a study where researchers validated the original MSLQ as a starting point. They conducted a threepart research program to refine the items into a usable set: expert panel review, extensive pilot study, and factor analysis of ratings of a modified set of statements by preclinical and final-year medical graduates. Two of the four components of the solution to the factor analysis of the 585student MLSQ sample were combinations of two original MLSQ subscales. The modified MSLQ is a tool for studying and monitoring medical students' personal growth (39). Similarly, researchers validated the scale in the Chinese context for the mathematics subject among 563 secondary-level students. They validated the Chinese MSLQ version (MSLQ-C) and the short Chinese version (MSLQ-CS). They found that MSLQ-CS had an extended learning scope. Thev mathematics also investigated the fact that MSLQ-CS exhibits acceptable properties (psychometric) and can measure students' self-regulation in a shorter version. Therefore, it can be used to reduce the burden on students and the extensive time used for data collection (40). In continuation, a study validated the Spanish version of MSLQ in Colombia for engineering students. It was found that MSLQ-Colombia was a reliable instrument with 11 subscales of learning and seven subscales of epistemic motivation. It had 75 items (45 for LS and 30 for epistemic motivation). The researchers also found that MSLQ-Colombia applies in contexts other than Colombian ones (4). A study conducted a comprehensive review of the Ibero-American literature on SLR in undergraduates and found that only five Latin American countries have published research in this field. This topic of study is still in its early phases in this particular environment. Given that the MSLQ is the primary assessment tool for evaluating SRL, it becomes essential to validate procedures that result in versions of the measure that accurately reflect the most significant components of SRL in the particular educational context (25). Argentina and Uruguay share similarities in higher education,

where public management universities are institutions with flexible admission policies aimed at increasing inclusion, but face challenges, as roughly half of enrolled students drop out (41). Cognitive and non-cognitive factors related to academic performance have been studied by psychology researchers. Given these antecedents, it is essential to define SRL processes specific to Argentina and Uruguay because of students' unique challenges when learning under crowded conditions (42). Another study confirmed the effectiveness of the SRL strategies dimension within the MSLQ, with strong results using a sixfactor scale (9). Similarly, Pakistan faces similar challenges regarding high dropout rates (43). Consequently, the current study proposes revalidation of the model (9). It is worth noting that while the original MSLQ has been validated in numerous Pakistani studies (44, 45), this research has the distinction of being the first to revalidate the abbreviated LS dimension in this region. Although different versions of MSLQ are validated across different regions of the world. However, the results are still conflicting. Moreover, its brief version has not been replicated in Pakistan's local context. Considering the knowledge gap for the particular region falling under developing countries, we designed the current study to validate the brief version of MSLQ in Pakistan's local context among university students.

# **Materials and Methods**

The research investigation utilized a quantitative cross-sectional approach to assess the psychometric characteristics of the LS dimension within the MSLQ and validate the tool's shorter version through confirmatory factor analysis (CFA). The primary tools used for this purpose were SPSS version 27 and AMOS version 24.

# Sample and Sampling Technique

Multi-stage and multi-method sampling techniques were used to reach out and select respondents. To gather data from students, the authors of the study created a Google Form. They distributed it to various professors across different universities in Pakistan (convenient sampling), inviting them to collaborate and share the link with their students (random sampling). Once these professors confirmed their participation, they ensured that all ethical guidelines were adhered to and then forwarded the link to their students, who voluntarily chose to participate. Along with providing detailed information on the purpose of the study, students were assured of anonymity and informed that they could withdraw from the survey at any time without facing any consequences. This approach allowed the collection of data from multiple universities in Pakistan. A total of 811 Pakistani University students (330 males and 480 females), with most participants from (N = 540) from the Punjab region of Pakistan, filled out the LS questionnaire. The current sample, 811, fulfills the criteria for factor analysis and is above the threshold level of 500 for a very good sample for factor analysis (46). Other demographic details are shown in Table 1.

Variables	Categories	Frequency	Percentage
Gender	Male	330	40.7
	Female	480	59.2
	Did not disclose	1	.1
Locality	Urban	504	62.1
	Rural	307	37.9
Socioeconomic Status	Upper class	22	2.7
	Middle class	750	92.5
	Lower class	39	4.8
Education Level	Graduation level	616	75.9
	MS/M.Phil.	171	21.1
	Ph.D.	24	3
Type of University	Public	556	68.6
	Private	255	31.4
Region in Pakistan	Punjab	540	66.6
	Sindh	29	3.6
	Baluchistan	32	3.9
	КРК	174	21.5
	AJK	18	2.2
	GB	2	.2
	Other	16	2.

**Table 1:** Participants' Information (N = 811)

#### **Instrumentation History**

A study conducted exploratory factor analysis (EFA) on the LS dimension of the MSLQ questionnaire, selecting three items for each subscale based on theoretical considerations, and achieving 46.916% of the total variance explained. The resulting EFA model was subsequently validated through CFA separately for samples from Argentina (CFI = .93, RMSEA = .060) and Uruguay (CFI = .94, RMSEA = .057) (9). In this study, the abbreviated LS version is again confirmed via EFA and then CFA to ensure its suitability in the new context. This short LS version comprises six subvariables, each with three items: Rehearsal, Elaboration, Organization, Critical thinking, Time and study environment management (TSEM), and Peer Learning (PL). Students replied to the questionnaire on a 5-point Likert scale, ranging from 1 for 'strongly disagree' to 5 for 'strongly agree'. For more information about the questionnaire used for data collection, refer to Annexure 1.

# Results

The study tested the psychometric properties of the MSLQ's LS dimension. To achieve this purpose, EFA and CFA were conducted using SPSS version 27 and AMOS version 24. The influence of normality can be substantial in small samples, but as the sample size increases to 50, its impact diminishes (47). Given that the sample in our study consists of a substantial number of observations (N = 811), researchers assumed the sampling distribution of the mean to approximate normality.

#### **Exploratory Factor Analysis**

For the first time, the abbreviated version of the instrument underwent revalidation within the context of Pakistan. An EFA was conducted using SPSS version 27 to ascertain the instrument's construct validity and reliability. Preliminary

Vol 6 | Issue 2

analyses demonstrated that the sample size is sufficient, with a Kaiser-Meyer-Olkin (KMO) value exceeding .7 (.929) with a recommended participant-to-item ratio of 5:1 and power analysis using G\*Power. Based on this criterion, a minimum sample of 500 was required. However, to enhance the reliability of the findings, a total of 811 participants were recruited (48). Additionally, the significance of Bartlett's test ( $\chi$ 2(153) = 5037.334, p < .001) allows for an EFA. It indicates that the correlation matrix was appropriate for factor analysis. The results of the EFA, including factor loadings, are presented in Table 2. Construct validity is measured through the Average Variance Extracted (AVE), which was .65 and can be considered good. For every construct, Cronbach's alpha is higher than .5, indicating that the subscales are reliable. Following the EFA, two items from the factor TSEM were eliminated to meet model fit criteria and reliability measures. The whole factor was removed since TSEM only has one item left. The final questionnaire comprises 15 items distributed across five primary factors.

Гable 2: Exploratory Factor Analysis										
Statement	Factor Lo	Reliability								
	Critical Thinking	Organization	Rehearsal	Peer learning	Elaboration	Time and study environment management (TSEM)	Cronbach Alpha			
S1	.175	.105	.152	.207	.729					
S2	.191	.232			.706					
S3	.143	.146	.173	.228	.648		.654			
S4	.114	.192	.117	.667	.338					
S5	.192	.114	.181	.752	.136					
S6	.264	.279	.152	.714			.728			
S7	.241	.660	.119	.248	.218					
S8	.117	.779	.193	.223	.153		.776			
S9	.238	.700	.298	.138	.158					
S10	.437	.468			.244	.203				
S11	.663	.264			.267					
S12	.725	.153		.166	.130		.680			
S13	.589	.195	.255	.310	.147					
S14						.976				
(reverse										
statement)	<b>1</b> 0		10.6							
S15	.650		.436	.228						
S16	.472	.183	.480	.116	.227	.472	.739			
S17	.147	.164	.791	.197	.165	.147				
S18	.115	.231	.794	.140	.146	.115				

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

#### **Confirmatory Factor Analysis**

To further validate the study's model and assess model fitness, we conducted a CFA using AMOS. The CFA results reinforced that the most suitable model for the Pakistani context comprises five subfactors and 15 items. Model fitness criteria also confirmed the appropriateness of the five-factor model for the Pakistani context (Figure 2 and Table 3).



Figure 2: Confirmatory Factor Analysis for LS Questionnaire

Model Fitness Criteria	Recommended Range	Fit Indices of the Final	Reference
	0	Questionnaire	
x 2 (Chi-square)		217.495	
Df		80	
Chi-square/df (x 2/df)	<3	2.719	(49)
GFI	>.9	.964	(50)
AGFI	>.80	.946	(51)
RMSEA	<.07	.046	(52)
RMR	<.08	.032	(50)

Table 3: Model	Fitness	Indices
----------------	---------	---------

# Influence of Demographics on Learning Strategies

We conducted an independent sample *t*-test to assess how the location of institutions (urban and rural universities) impacts students' LS. Despite substantial variations in the educational landscape between urban and rural areas, the results do not

affirm any significant disparities in students' LS (Table 4).

Similarly, an independent sample *t*-test was conducted to ascertain distinctions in the LS utilized by male and female students. Nonetheless, no statistically significant difference was detected, as evidenced by a p-value exceeding .05 (Table 5).

**Table 4:** Independent Sample *t*-test (Urban-Rural Differences)

Variable		N	Μ	SD	Mean	t-value	df	Sig. (2
					Difference			tailed)
Elaboration	Urban	504	3.7500	.67564		.372	809	.710
					.01819			
	Rural	307	3.7318	.67486				
Peer	Urban	504	3.8029	.72444		154	809	.878
Learning					00816			
	Rural	307	3.8111	.75006				
Organization	Urban	504	3.7870	.78114		592	809	.554
					03381			
	Rural	307	3.8208	.80040				
Critical	Urban	504	3.6898	.66643		-1.440	809	.150
Thinking					06697			
	Rural	307	3.7568	.60094				
Rehearsal	Urban	504	3.8657	.69858		553	809	.580
					02894			
	Rural	307	3.8947	.75991				

#### **Table 5:** Independent Sample *t*-test (Gender Differences)

Variable		N*	М	SD	Mean	t-value	Df	Sig. (2-
					Difference			tailed)
Elaboration	Male	330	3.7384	.73503		197	808	.844
					00953			
	Female	480	3.7479	.63100				
Peer Learning	Male	330	3.8101	.77379		.139	808	.889
					.00732			
	Female	480	3.8028	.70653				
Organization	Male	330	3.7545	.84577		-1.337	808	.182
					- 07532			
	Female	480	3.8299	.74581				
			0 (000	54050		4.050	000	0.01
Critical	Male	330	3.6808	.71350		-1.279	808	.201
Thinking					05878			
	Female	480	3.7396	.58948				
Rehearsal	Male	330	3.8182	.79168		-1.884	808	.060
					- 09710			
	Female	480	3.9153	.66788	.07/10			

\*The test was conducted on a sample comprising 810 students, except one student who chose not to disclose their gender.

#### **Table 6:** Independent Sample *t*-test (Public-Private Sector Differences)

Variable		Ν	М	SD	Mean	t-value	Df	Sig. (2-
					Difference			tailed)
Elaboration	Public	556	3.7494	.66693		.391	809	.696
					.01999			
	Private	255	3.7294	.69335				
Peer Learning	Public	556	3.7998	.73866		357	809	.721
					01985			
	Private	255	3.8196	.72432				
Organization	Public	556	3.7974	.76883		132	809	.895
					00787			
	Private	255	3.8052	.83029				
Critical	Public	556	3.7194	.62993		.278	809	.781
Thinking					.01354			
	Private	255	3.7059	.67140				
Rehearsal	Public	556	3.8681	.71575		500	809	.617
					02732			
	Private	255	3.8954	.73677				

In the same way, we found no significant difference in how students from public and private universities use strategies (Table 6). A one-way ANOVA was performed to investigate variations in strategies across different Pakistani states; however, no statistically significant differences were identified (Table 7).

Likewise, to explore whether there are variations in the adoption of diverse LS as educational levels progress (from Graduation to Master's and PhD), a

Pearson Correlation test was conducted. It was intriguing to note that, as educational levels increased, students tended to embrace strategies linked to elaboration and critical thinking. Another discovery from the Pearson correlation analysis indicates that these strategies are interconnected, implying that when students adopt one learning strategy for academic success, the utilization of other strategies will also progressively and concurrently increase (Table 8).

		Sum of	df	Mean	F	Sig.	Levene	Sig.
		Squares		Square			Statistic	
Elaboration	Between	2.102	6	.350	.768	.596	.725	.630
	Groups							
	Within	366.936	804	.456				
	Groups							
Peer	Between	3.582	6	.597	1.110	.355	.427	.861
Learning	Groups							
	Within	432.562	804	.538				
	Groups							
Organization	Between	4.856	6	.809	1.306	.252	1.297	.256
	Groups							
	Within	498.317	804	.620				
	Groups							
Critical	Between	5.001	6	.833	2.032	.059	.949	.459
Thinking	Groups							
	Within	329.758	804	.410				
	Groups							
Rehearsal	Between	3.155	6	.526	1.009	.418	3.653	.001
	Groups							
	Within	419.181	804	.521				
	Groups							

Table 7: One-Way ANOVA	(Regional Differences)
------------------------	------------------------

	Table	8:	Pears	son's	Corre	lation
--	-------	----	-------	-------	-------	--------

		-					
Variables	1	2	3	4	5	6	
Elaboration	1	.479**	.523**	.513**	.480**	.091**	
Peer Learning		1	.552**	.499**	.515**	.048	
Organization			1	.562**	.556**	.050	
Critical				1	.491**	.082*	
Thinking							
Rehearsal					1	.041	
Education						1	
Level							

\*p < .01, \*\*p < .001

# Discussion

This study aimed to verify a shorter version of the LS part of the MSLQ used in academic settings in Uruguay and Argentina. The research examined the previously obtained structure to determine whether its findings hold across various academic and national contexts (9). The objective was to create a highly concise version of the LS section of the MSLQ tailored for use by students in Pakistan. This was done to ensure the validity and reliability of the instrument in this context and to provide a

Vol 6 | Issue 2

shorter assessment tool for measuring students' LS more efficiently. To select the theoretically most resilient items, researchers had to examine the internal organization of the LS part of the MSLQ. The model structure was also tested in light of demographic factors. Last, each subfactor's internal consistency was assessed. The findings of this study align with and expand upon previous research validating the Motivated Strategies for Learning Questionnaire (MSLQ) in diverse educational contexts. Similar to earlier validation studies (1, 8), our results confirm the structural integrity of the MSLQ, demonstrating strong internal consistency and factorial validity across its motivational and learning strategy components. This consistency underscores the robustness of the MSLQ as a reliable tool for assessing students' motivational orientations and self-regulated learning strategies. In the new context, running EFA followed by CFA to confirm the factors was necessary. The subscales used for CFA were named "TSEM," "Rehearsal," "critical thinking," "elaboration," "peer learning," and "organization." However, the current study found that sub-factor TSEM was unsuitable for this context, as factor loadings and model fitness criteria did not meet threshold values. Therefore, according to theory, the remaining five sub-factors that pertain to the application of particular cognitive methods by students to memorize, learn, reason, solve issues, and think were retained (15). In addition, parts of the resource management tactics distributed in peer learning were also retained. Thus, an abridged version with satisfactory validity was obtained. One possible reason for this outcome in the context of Pakistani students could be cultural differences or variations in how time management is perceived and practiced. Pakistani students may have different approaches to time and study environment management. They may prioritize specific strategies over others, leading to weaker factor loading for this particular strategy. Educational and environmental factors specific to Pakistan may also influence students' time and study environment management strategies. Further research and qualitative investigations could provide deeper insights into the reasons behind this finding. Additionally, our findings extend the literature by exploring the relationships between MSLQ components and academic performance. Consistent with prior research (16),

we observed significant positive correlations between self-regulated learning strategies and students' academic achievement. However, our study also highlights the mediating role of selfefficacy in these relationships, emphasizing the need for further research on how motivational beliefs influence learning strategy use across different student populations. The CFA proceeded smoothly because the abridged version had already removed a number of the problematic items that EFA had highlighted in the antecedents. While preserving significant components of SRL at the university level, it minimizes the dimensions. These include the application of cognitive techniques and the control of resources like PL. Selected subscales exhibited acceptable factorial loads, and modification indices were applied where covariances were necessary. The resultant structure demonstrated strong theoretical and statistical robustness as a result of all of this. As a result, we can conclude that most objects obtained using EFA formed a pattern comparable to the one created by CFA. The acquired version will enable research on how local Pakistani pupils selfregulate their learning. Studies posit that disparities exist between educational institutions in rural and urban areas, impacting students' academic performance (53, 54). However, a recent study contends that despite variations in urban and rural educational institutions, students in rural areas can achieve similar outcomes when provided with equal educational opportunities comparable to their urban counterparts. This is because using LS is an inherent characteristic of individual students and remains unaffected by external resources or constraints. Consequently, this study concludes that students from both urban and rural regions employ similar LS to enhance their academic achievements. The discrepancies in educational outcomes between rural and urban areas are not contingent upon student engagement but rather on external factors. A study has observed a notable distinction in the upbringing of male and female individuals within Pakistani society. Furthermore, despite an equal male-tofemale ratio in the population (1,033 males per 1,000 females), educational opportunities favor male individuals, resulting in a higher literacy rate among males. However, in their recent research, it was emphasized that female students can achieve similar or superior outcomes if provided with

comparable opportunities. The study's findings also indicate that, despite societal disparities, there are no statistically significant differences in the LS adopted by male and female university students in Pakistan. A recent study highlighted significant distinctions between the public and private education sectors. Similarly, in response to perceived shortcomings in public education, parents are choosing to enroll their children in private schools, even in low- and middle-income countries like Pakistan, where it is commonly believed that students from private schools perform better than those in public schools (55). Surprisingly, the research shows that despite these differences, the LS employed by students in both sectors exhibits no noteworthy disparities. Despite substantial differences among various provinces of Pakistan regarding population, culture, economy, educational opportunities, and languages (56, 57), no significant variance was observed among students in their utilization of different LS. However, an intriguing discovery emerged concerning education levels and the strategies employed. Students use SRL strategies to adjust to their learning process and self-regulate their learning, but these strategies are inconsistent (58, 59). Although the strategies correlate with academic achievement (35, 60, 61). The findings are consistent with the literature and indicate that as students advanced in their educational degrees, they increasingly employed critical thinking strategies, a significant requirement for researchoriented degrees such as MS or PhD. Additionally, it was noted that students with higher educational levels also demonstrated a greater inclination toward engaging in more elaborate tasks. The elaboration aspect of LS involves connecting interdisciplinary knowledge with real-world practical examples. Given that contemporary research is often interdisciplinary and not limited to a specific field, these results support the notion that students become more involved in complex tasks as they progress in their higher education.

# Conclusion

The strength of this study lies in its comprehensive data collection from all provinces in Pakistan, marking the first time a condensed version of LS has been revalidated in this new context. The fivefactor condensed instrument is well-suited to this society and can effectively assess and guide university students in improving their academic

outcomes through enhanced LS. Educators and researchers are encouraged to utilize this refined version of the MSLQ, as it provides a more contextually appropriate and efficient measure of learning strategies in this setting. Additionally, they should prioritize translating and adapting this instrument into national and regional languages to enhance accessibility and reliability in assessments. Implementing these modifications will help ensure that learning strategies are accurately assessed and effectively applied in diverse educational contexts. It is advisable to translate the condensed version into national and regional languages previously recommended the need for translated versions of psychological instruments in the Pakistani context. Since English is not widely understood, creating and validating translated versions is crucial for reliable assessments.

# Limitations

The limitations of this study primarily stem from the use of a survey method and the exclusive reliance on a sample drawn solely from university students. This approach may restrict the generalizability of the findings as it does not encompass a broader cross-section of the population. While valuable for collecting data, survey methods may not capture the full depth and complexity of the subject matter, potentially overlooking nuances that could be better explored through qualitative or mixed-methods approaches. Furthermore, confining the study to university students may limit the applicability of the results to other age groups or individuals outside of the academic context, highlighting the need for caution when extrapolating the findings to a broader population.

# Abbreviations

None.

# Acknowledgment

We acknowledge the volunteer participation of respondents.

# **Author Contributions**

Muhammad Kamran: Conceptualization, Formal Analysis, Resources, Writing – Original Draft Preparation, Project Administration, Sarfraz Aslam: Conceptualization, Validation, Writing – Review and Editing, Supervision, Arfa Mubeen: Methodology, Validation, Data Curation, Writing – Original Draft Preparation, Sohni Siddiqui: Methodology, Software, Writing – Review and Editing, Visualization, Amjad Islam Amjad: Validation, Investigation, Writing – Original Draft Preparation, Shumaila Mansha: Review, Revising and Editing Final Draft Preparation.

#### **Conflict of Interest**

The authors declare no conflict of interest.

#### **Ethics Approval**

The Institutional Ethics Review Board of the Department of Education, University of Loralai, Balochistan (IERB#10-2024/UL) approved the study. The complete study and questionnaire underwent ethical review by the committee, which identified no potential conflicts of interest or harm to participants, nor any activities that exceeded the ethical code of conduct.

#### Funding

UNITAR International University Malaysia supported the publication fee under the Internal Grant-2024 (Ref. No: IG04/FEH/03-2024).

# References

- 1. Puspitarini YD, Hanif M. Using Learning Media to Increase Learning Motivation in Elementary School. Anatolian Journal of Education. 2019;4(2):53–60.
- Schiefer J, Golle J, Tibus M, Herbein E, Gindele V, Trautwein U, et al. Effects of an extracurricular science intervention on elementary school children's epistemic beliefs: A randomized controlled trial. British Journal of Educational Psychology. 2020;90(2):382–402.
- Filgona J, Sakiyo J, Gwany DM, Okoronka AU. Motivation in Learning. Asian Journal of Education and Social Studies. 2020 Sep; 10(4);16–37.
- Ramírez Echeverry JJ, García Carrillo À, Olarte Dussan FA. Adaptation and validation of the motivated strategies for learning questionnairemslq-in engineering students in Colombia. International journal of engineering education. 2016; 32(4):1774–87.
- 5. Amjad AI, Habib M, Saeed M. Effect of brain-based learning on students' mathematics performance at elementary level. Pakistan Journal of Social Research. 2022;4(03):38–51.
- 6. Rehman A, Jingdong L, Hussain I. The province-wise literacy rate in Pakistan and its impact on the economy. Pacific Science Review B: Humanities and Social Sciences. 2015;1(3):140–4.
- Amjad AI, Tabbasam U, Habib M. Uncovering teachers' concerns and multi-dimensional attitude towards inclusive education: Who's included and who's excluded. Journal of Contemporary Trends and Issues in Education. 2023; 2(3):1–22.
- 8. Duncan TG, McKeachie WJ. The Making of the Motivated Strategies for Learning Questionnaire. Educ Psychol. 2005;40(2):117–28.
- 9. Curione K, Uriel F, Gründler V, Freiberg-Hoffmann A. Assessment of learning strategies in college

students: a brief version of the MSLQ. Electronic Journal of Research in Education Psychology. 2022; 20(56):201.

- 10. Dunn KE, Lo WJ, Mulvenon SW, Sutcliffe R. Revisiting the Motivated Strategies for Learning Questionnaire. 2011;72(2):312–31.
- 11. Tabassum U, Qiang X, Abbas J, Amjad AI, Al-Sulaiti KI. Students' help-seeking mediates the relationship between happiness and self-strength: a comparative study on Chinese and Pakistani adolescents. Kybernetes. 2024. https://doi.org/10.1108/K-09-2023-1706
- 12. Tabbasam U, Amjad AI, Ahmed T, Qiang X. Comparison of self-strength, seeking help and happiness between Pakistani and Chinese adolescents: A positive psychology inquiry. International Journal of Mental Health Promotion. 2023;25(3):389–402.
- 13. Azmuddin RA, Nor NFM, Hamat A. Facilitating online reading comprehension in enhanced learning environment using digital annotation tools. IAFOR Journal of Education. 2020;8(2):9.
- 14. Sweller J. Cognitive load theory and educational technology. Educational Technology Research and Development. 2020;68(1):1–16.
- 15. Pintrich PR. A conceptual framework for assessing motivation and self-regulated learning in college students. Educ Psychol Rev. 2004;16(4):385–407.
- Pintrich PR, Smith DAF, Garcia T, Mckeachie WJ. Reliability and Predictive Validity of the Motivated Strategies for Learning Questionnaire (MSLQ). 1993. 53(3):801–13.
- Curione K, Huertas JA, Ortuño V, Gründler V, Píriz L. Validation of the Learning Strategies Block of the MSLQ with Uruguayan University Students. Interamerican Journal of Psychology. 2019. 53(1):66-80.
- Emory B, Luo T. Metacognitive Training and Online Community College Students' Learning Calibration and Performance. Community Coll J Res Pract. 2022. 46(4):240–56.
- 19. Marantika JER. Metacognitive ability and autonomous learning strategy in improving learning outcomes. Journal of Education and Learning (EduLearn). 2021;15(1):88–96.
- 20. Pintrich PR, Smith DAF, Duncan T, Mckeachie WJ. A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ). University of Michigan;1991. https://files.eric.ed.gov/fulltext/ED 338122.pdf
- 21. Jiang Q, Horta H, Yuen M. International medical students' perspectives on factors affecting their academic success in China: a qualitative study. BMC Med Educ. 2022;22(1):1–16.
- 22. Kaskosh E, Khateb A. Implementing Meta-Cognitive Learning Strategies to Improve Intertextual Arabic Comprehension Competences: An Intervention Study Among Arabic-speaking Tenth Graders. Theory and Practice in Language Studies. 2021;11(7):757–67.
- 23. Anselmi P, Colledani D, Robusto E. A Comparison of Classical and Modern Measures of Internal Consistency. Front Psychol. 2019;10:1-12.
- 24. Amjad AI, Aslam S, Habib M, Sial ZA, Shahidi Hamedani S. Society 5.0's impact on STEM helpseeking: unpacking teacher-student interactions.

Pedagogies: An International Journal. 2025. 1–21. https://doi.org/10.1080/1554480X.2025.2483527

- Hernández Barrios A, Camargo Uribe Á. Selfregulation of learning in higher education in Ibero-America: A systematic review. Revista Latinoamericana de Psicología. 2017;49(2):146–60.
- 26. Ortega FZ, Martinez AM, Cuberos RC, Jiménez JLU. Analysis of the Psychometric Properties of the Motivation and Strategies of Learning Questionnaire—Short Form (MSLQ-SF) in Spanish Higher Education Students. Social Sciences. 2019;8(5):132.
- 27. Segura-Robles A, Moreno-Guerrero AJ, Parra-González ME, López-Belmonte J. Adaptation and Validation of the Motivated Strategies for Learning Questionnaire for Spanish Adolescents. European Journal of Investigation in Health, Psychology and Education. 2021;11(1):142–53.
- Jakešová J, Hrbáčková K. The Czech adaptation of motivated strategies for learning questionnaire (MSLQ). Asian Soc Sci. 2014;10(12):72–8.
- 29. Jackson CR. Validating and Adapting the Motivated Strategies for Learning Questionnaire (MSLQ) for STEM Courses at an HBCU. AERA Open. 2018;4(4): 1-16.
- 30. Inzunza B, Pérez C, Márquez C, Ortiz L, Marcellini S, Duk S. Factor Structure and Reliability of the Motivation and Learning Strategies Questionnaire (MSLQ) in First-Year Chilean University Students. Ibero-American Journal of Psychological Diagnosis and Evaluation. 2018;2(47):21–35.
- 31. Chow CW, Chapman E. Construct Validation of the Motivated Strategies for Learning Questionnaire in a Singapore High School Sample. J Educ Develop Psychol. 2017 Sep 20;7(2):107.
- 32. Cazan AM. Validity of the Motivated Strategies for Learning Questionnaire on a Romanian sample. Revista de Psychologie. 2117;63(3):151–62.
- 33. Bonanomi A, Olivari MG, Mascheroni E, Gatti E, Confalonieri E. Using a multidimensional rasch analysis to evaluate the psychometric properties of the Motivated Strategies for Learning Questionnaire (MSLQ) among high school students. TPM Test Psychom Methodol Appl Psychol. 2018;25(1):83.
- 34. Hilpert JC, Stempien J, Van Der Hoeven Kraft KJ, Husman J. Evidence for the latent factor structure of the MSLQ: A new conceptualization of an established questionnaire. Sage Open. 2013;3(4): 1-10.
- Credé M, Phillips LA. A meta-analytic review of the Motivated Strategies for Learning Questionnaire. Learn Individ Differ. 2011;21(4):337–46.
- 36. Kumar V, Gupta J. Validation of motivated strategies for learning questionnaire (MSLQ) in the Indian context. International Journal of Future Generation Communication and Networking. 2020;(2):507–17.
- 37. Tock JL, Moxley JH. A comprehensive reanalysis of the metacognitive self-regulation scale from the MSLQ. Metacogn Learn. 2017;12(1):79–111.
- 38. Kim Y eun, Brady AC, Wolters CA. College students' regulation of cognition, motivation, behavior, and context: Distinct or overlapping processes? Learn Individ Differ. 2020;80:101872.
- 39. Soemantri D, McColl G, Dodds A. Measuring medical students' reflection on their learning: Modification and validation of the motivated strategies for

learning questionnaire (MSLQ). BMC Med Educ. 2018;18(1):1-10.

- 40. Wang F, Jiang C, King RB, Leung SO. Motivated Strategies for Learning Questionnaire (MSLQ): Adaptation, validation, and development of a short form in the Chinese context for mathematics. Psychol Sch. 2023;60(6):2018–2040.
- 41. Otero A. Argentina, Brazil, and Uruguay: Higher Education and Inclusion Policies. Integration and Knowledge. 2017. 6(1).

https://doi.org/10.61203/2347-0658.V6.N1.17125

42. Stover JB, Uriel FE, Freiberg Hoffmann A, Fernandez Liporace MM. Learning Strategies and Academic Motivation in University Students of Buenos Aires. 2015. 69-92.

https://doi.org/10.18682/pd.v15i1.484

- 43. Amjad AI, Tabbasam U, Abbas N. The Effect of Brain-Based Learning on Students' Self-Efficacy to Learn and Perform Mathematics: Implication of Neuroscience into School Psychology. Pakistan Languages and Humanities Review. 2022, 6(3):683– 695.
- 44. Khurshid F. Online Collaboration and Self-Regulated Learning in Online Learning Environment. PJDOL. 2020;6(1):177–93.
- 45. Nausheen M. An Adaptation of the Motivated Strategies for Learning Questionnaire (MSLQ) for Postgraduate Students in Pakistan: Results of an Exploratory Factor Analysis. Bulletin of Education and Research. 2016;38(1):1–16.
- Kyriazos TA. Applied Psychometrics: Sample Size and Sample Power Considerations in Factor Analysis (EFA, CFA) and SEM in General. Psychology. 2018;09(08):2207–30.
- 47. de Winter JCF, Dodou D, Wieringa PA. Exploratory Factor Analysis with Small Sample Sizes. Multivariate Behav Res. 2009;44(2):147–81.
- 48. Kaiser HF, Rice J. Little Jiffy, Mark Iv. Educ Psychol Meas. 1974;34(1):111–7.
- 49. Kline RB. Principles and practice of structural equation modeling. Can Stud Popul. 2011; 45(3):188–95.
- 50. Tabachnick BG, Fidell LS. Using multivariate statistics, 5th ed. Allyn and Bacon. 2007;5(7): 1-14.
- 51. Hooper D, Coughlan J, Mullen MR. Structural Equation Modelling: Guidelines for Determining Model Fit. Electronic Journal of Business Research Methods. 2008; 6(1):53-60.
- 52. Steiger JH. Understanding the limitations of global fit assessment in structural equation modeling. Pers Individ Dif. 2007; 42(5):893–898.
- 53. Tayyaba S. Rural-urban gaps in academic achievement, schooling conditions, student, and teachers' characteristics in Pakistan. International Journal of Educational Management. 2012; 26(1):6–26.
- 54. Amjad AI, Arshad L, Saleem Z. Mediational effect of students' creativity on the relationship between leadership and academic success: Well-being as moderator. Educational Research and Innovation. 2024;4(1):1–23.
- 55. Alderman H, Orazem PF, Paterno EM. School quality, school cost, and the public/private school of choices of low-income households in Pakistan. Journal of Human Resources. 2001; 36(2):304–26.

- 56. Aslam M, Kingdon GG. Gender and household education expenditure in Pakistan. Appl Econ. 2008; 40(20):2573–91.
- 57. Shafqat F, Amjad AI. Examining Students' Perceptions, Experiences, and Ethical Concerns about Using ChatGPT for Academic Support: A Phenomenological Study. Pakistan Social Sciences Review. 2024;8(2):443–55.
- 58. Zusho A. Toward an Integrated Model of Student Learning in the College Classroom. Educ Psychol Rev. 2017;29(2):301–24.
- 59. Amjad AI, Aslam S, Tabassum U. Tech-infused classrooms: A comprehensive study on the interplay

of mobile learning, ChatGPT and social media in academic attainment. European Journal of Education. 2024;59(2). e12625.

- 60. Lodewyk KR, Winne PH, Jamieson-Noel DL. Implications of task structure on self-regulated learning and achievement. Educ Psychol (Lond). 2009;29(1):1–25.
- 61. Dent AL, Koenka AC. The Relation Between Self-Regulated Learning and Academic Achievement Across Childhood and Adolescence: A Meta-Analysis. Educ Psychol Rev. 2016;28(3):425–74.