

Psychometric Features of Motivated Strategies for Learning Questionnaire (MSLQ) Among the Students of Higher Education Sector in Karachi –Pakistan


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ARTICLE DETAILS	ABSTRACT
<p>History <i>Received: November 2021</i> <i>Available online: December 2021</i></p> <hr/> <p>Keywords <i>Self-regulated Learning</i> <i>Strategic Learning</i> <i>Peer Learning</i> <i>Emotion Regulation</i> <i>Curriculum Policy</i> <i>Path Analysis</i></p>	<p>Purpose: The motivated strategies for learning questionnaire (MSLQ) are extensively used by researchers and educators to measure self-regulated learning skills. The survey originally published in English has also been translated into multiple languages. However, a gap in the literature is found for its reliability and validity studies in the Pakistani context, specifically in the higher education sector. Therefore, this study was designed to establish the local norms and appraise the scale factors in specific samples and cultures.</p> <p>Methodology: Path analysis was used to examine the latent factor structures to determine whether MSLQ is appropriately reliable and valid to be used on our normative sample. All 15 subscales of the MSLQ were administered to a sample of 272 (n: 272) students enrolled in the undergraduate program of a private university located in Karachi, Pakistan.</p> <p>Findings: Results from the administration of MSLQ on a sample from the local population suggest that the scale is reliable and valid. Subscales (the exogenous variables) were loaded onto their respective factors with high regression weights. Statistically significant correlations were found among eleven subscales and the academic performances of students. The gender difference was found in eight subscales with significant Cohen's D. However, the model fit indices on SEM show a relative fit and poor fit on some of the indices.</p> <p>Conclusion: This study concludes that students' learning strategies and motivation have an impact on academic outcomes and considerable gender difference prevails in terms of motivation and learning strategies in Pakistani students.</p>
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1. Introduction

Self-regulated learning (SRL) emerged as a widely researched theme in educational psychology in the past three decades. Surfaced in the academic arena in the 1980s, the construct soon drew the attention of researchers in the field and since then, profound researches have been produced on this topic.

Before the 1980s, students' differences in learning and academic performance were chiefly explained in terms of differences in their intelligence by researchers (Zimmerman, 2002). However, later with the emergence of the construct of self-regulated learning, a major shift in understanding students' differences took place. Researchers identified students' self-regulation as one of the determinants of successful learning (Schunk, 1984). A growing body of empirical researches attributes students' achievement and academic performance to their ability to regulate their learning. (El-Adl & Alkharusi, 2020; Sun et al., 2018; Nota et al., 2004; Zimmerman, 1990 & 2002; Pintrich et al., 1993; Pintrich & De Groot, 1990). Considering the vital role of various components of self-regulated learning in achievement and performance, in and out of academic context, researchers argue that fostering self-regulated learning is one of the major goals of modern education (Puustinen & Pulkkinen, 2001).

The global Covid-19 pandemic interrupted many dimensions of our life including education. The pandemic led to a sudden transition from face-to-face to online or hybrid learning in higher education institutions all over the world. Many researchers suggest that online learning will continue to be an integral part of teaching and learning even after the pandemic is over. In comparison to traditional face-to-face learning, a learner in online learning needs to be more autonomous and in control of his/her learning process. For effective learning, online students must be self-motivated and disciplined (Carter Jr et al., 2020; Jansen et al., 2020). They are expected to take responsibility for their learning by managing, accessing, and monitoring their learning. Hence understanding the learners' application and adjustment of SRL becomes even more important.

The present study was initially designed to have a better understanding of the use of self-regulated learning skills among the students of the higher education sector in Pakistan by exploring the relationship between their self-regulated learning and academic performance. During the literature review, MSLQ was identified as a widely used instrument to measure students' self-regulated learning. MSLQ's validity has been well established with various validation studies. However, the validation studies were majorly conducted in the western context. As MSLQ and the model it is based on, were developed in the western cultural and educational context, therefore researchers emphasized the need to assess the psychometrical soundness of MSLQ for the non-western sample population (Tong et al., 2019; Pitkethly and Lau 2016; Rotgans & Schmidt, 2008). Thus, various validation studies of MSLQ were conducted in the non-western contexts as well (Maun et al., 2020; Tong et al., 2019; Bin Dayel et al., 2018; Rotgan & Schmidt, 2008). Nevertheless, the psychometric studies of MSLQ in the higher education sector in the Pakistani context are quite limited. To our best knowledge, only one validation study on MSLQ is conducted in the Pakistani context (Nausheen, 2016). Moreover, Nausheen (2016) assesses the validity of only the motivation subscale of MSLQ and does not study MSLQ in its entirety.

Hence, to fill this gap, the current study aims to investigate whether MSLQ, in its totality,

is psychometrically sound for the student population of the higher education sector in Pakistan. Moreover, the present study will also explore the relationship of self-regulated learning strategies with students' motivation and academic achievement among the students of higher education in Pakistan. Additionally, the relationship between gender and self-regulated learning will be examined.

2. Literature Review

2.1. Self-Regulated Learning

Self-regulated learning is an umbrella term that includes cognitive, metacognitive, behavioral, motivational, and volitional components that influence learning. Self-regulated students are empowered and autonomous learners who actively participate in their learning process and hence take responsibility for learning. They set learning goals, select, and deploy appropriate cognitive strategies for these goals, monitor and evaluate learning progress, manage intruding effects and ebbing motivation, and adapt cognitive strategies and motivational beliefs to accomplish learning goals (Schunk & DiBenedetto, 2020; Zimmerman & Schunk, 2011; Schunk, 2005; Pintrich, 1999; Boekaerts, 1999; Zimmerman, 2008 & 1986). Thus, self-regulated learning refers to "the degree to which students are metacognitively, motivationally and behaviorally active participants in their learning process" (Zimmerman, 1989, p. 329)

Various models of SRL have been proposed by different researchers that identify and organize multiple components of SRL (Boekaerts & Niemivirta, 2000; Pintrich, 2000; Winne & Hadwin, 1998). As these models emerged from different theoretical backgrounds, they differ from each other. However, close analysis of these models suggests that despite the differences they share, major components of self-regulated learning described earlier and the difference between them lies in relative weightage assigned to these components (Puustinen & Pulkkinen, 2001; Winne, 2015). Overall, self-regulated learners are characterized as proactive learners who understand their strengths and learning needs. They can choose suitable learning strategies to meet the need and to manage their learning.

Among the models, Pintrich's (2000) model is all-inclusive. Rooted in the socio-cognitive perspective of Bandura (1986), Pintrich's (2000) model includes environmental or contextual aspects as well as cognitive and metacognitive facets of learning. Moreover, it also incorporates the motivational features of the learning. The model categorizes SRL processes into four phases:

(1) Forethought, planning, and activation; (2) Monitoring; (3) Control; and (4) Reaction and reflection.

Each phase has four areas of regulation i.e. cognition, motivation, behavior, and context. Thus, Pintrich's (2000) model provides a comprehensive picture of the self-regulated learning process detailing different phases of regulation and various regulatory activities in each of the phases.

2.2. Self-Regulated Learning and Academic Performance

The relationship between self-regulated learning and academic achievement has been extensively researched over the past few years in various educational settings. For example, El-Adl & Alkharusi (2020) investigated the relation of self-regulated learning strategies with motivation and academic achievement among ninth-grade mathematics'

students of the Sultanate of Oman. The study found a positive relationship between self-regulated learning strategies and positive motivation and academic achievement. It shows that students who are better at using cognitive and self-regulated learning strategies are more likely to learn effectively and score higher grades than others. Sun et al. (2018) explored the self-regulatory factors that affect academic achievement in flipped undergraduate math courses. The study reveals a significant relationship between academic achievement and two self-regulatory factors; self-efficacy and help-seeking strategies in the setting of the flipped math classrooms. Mega (2014) finds that students' positive emotions, self-regulated learning, and motivation have a positive relationship with students' academic achievement. The research further established that positive emotions themselves alone are not enough for academic achievement. Positive emotions positively influence academic performance only when mediated by motivation and self-regulated learning. Similarly, Nota et al. (2004) found that students' academic performance and academic resilience were significantly predicted by their self-regulated learning strategies chiefly, the strategy of organizing and transforming information.

In sum, recent researches have documented the significant role of self-regulated learning in effective learning and academic achievement. Recently, Garcia et al. (2021) scrutinize students' decisions about their use of learning strategies by examining the learning strategies students reportedly use and adapt if needed. It further explores the relationship of learning strategies with self-regulated learning and academic achievement. The result shows that students who are unable to manage their stu and lack knowledge of using learning strategies score lower grades. However, the research doesn't find a unique and consistent pattern in the real relationship between learning strategies, self-regulated learning, and academic performance. Thus, the research suggests the complex nature of their relationship.

The positive relationship between self-regulated learning and academic performance is further supported by the findings of SRL interventional programs. Meta-analytic research demonstrates that SRL interventions improve SRL strategies and motivation, which in turn, enhance academic performance (Öztürk & Çakıroğlu, 2021; Janssen, Jak, & Kester, 2019). Moreover, various meta-analytic researches showed that extended self-regulated learning training programs foster self-regulated learning strategies and motivation among students, and enhance their academic performance (Theobald, 2021).

2.3. Previous Validation Studies on MSLQ

With the progress in researches on the explication of the components of self-regulated learning and qualities of self-regulated students, researches on the development of tools to assess SRL has also advanced. Various instruments have been developed and used to measure the SRL (Winne & Perry, 2000; González-Torres & Torrano, 2008). The Motivated Strategies for Learning Questionnaire (MSLQ) is a tool widely used for examining the motivational as well as learning strategies' components of self-regulated learning and exploring the relationship between them and academic achievement. MSLQ is a self-report instrument developed by Pintrich and his colleagues (Pintrich et al., 1991 & 1993). The tool reflects Pintrich's SRL model that distinctively integrates the motivational processes to self-regulate learning emphasizing their importance as a key factor in self-regulated learning. MSLQ includes 81 items grouped in 15 sub-scales which are categorized into two sections, i.e., Motivation Section and Learning Strategies Section. The Motivational section is comprised of 31 items that assess students'

confidence in their ability and efforts to achieve learning goals, value beliefs for the learning tasks, and test anxiety. The section consists of three motivational components: 1. value component, 2. expectancy component, and 3. affective component. The Learning Strategies Section consists of 50 items that measure the learning strategies used by learners. It has two parts: The cognitive and Metacognitive Strategies part which is comprised of 5 sub-scales i.e., Critical Thinking, Rehearsal, Elaboration, Organization & Metacognitive self-regulation; and the Resource Management Strategies part which includes 4 sub-scales i.e. Effort Regulation, Peer Learning, Time and Study Environment, & Help-Seeking.

Though the developers of the MSLQ have provided good evidence to establish its reliability and validity, the significance of assessing reliability and validity of the instrument with a diverse population in different contexts has been emphasized by researchers (Taylor, 2012; Cho & Summers, 2012; Pintrich et al., 2000). Considering the need, multiple validation studies of MSLQ have been conducted, however, mostly with the population of western countries. As MSLQ is based on the SRL model developed in a western educational context that is shaped by western culture and values, researchers express their concern regarding the reliability and validity of MSLQ applied in non-western context (Tong et al., 2019; Pitkethly and Lau 2016; Rotgans & Schmidt, 2008). Consequently, cross-cultural validation studies of MSLQ have also been conducted in non-western countries (Tong et al., 2019; Bin Dayel et al., 2018; Rotgan & Schmidt, 2008). To the best of our knowledge, only one validating study of MSLQ has been conducted in Pakistan. Nausheen (2016) examines the internal reliability and factorial structure of motivational components of MSLQ with a group of 368 students in Punjab, Pakistan. The result shows a significant change in the factor structure of motivational scales of MSLQ with a sample of Pakistani students. The author explains the variations by drawing attention to different socio-cultural contexts and educational environments.

Though the study conducted by Nausheen (2016) provides significant insight into the validating studies of MSLQ in the context of Pakistan, it examines only the motivational part of MSLQ and does not assess the validity of the entire MSLQ with its 81 items. Therefore, the main objective of the present study is to test the validity of the entire MSLQ among the students of the higher education sector in Pakistan. It is believed that a val study of ent MSLQ with a different group of students in Pakistan will contribute to the existing literature on the cross-cultural validity of MSLQ in the context of Pakistan. Additionally, the present study is part of an effort to investigate the relationship of self-regulated learning strategies with students' motivation and academic achievement among the students of higher education in Pakistan. Moreover, the relationship between gender and self-regulated learning will be examined. Thus, our study is guided by the following four questions:

3. Methodology

3.1. Sample

The sample (n=272) for this study was drawn from one of the private universities in Karachi, Pakistan. Female participants were 32% [n=87] and male participants were 68% [n=185]. This sample size satisfies the minimum criteria for sample size provided by Comrey and Lee (1992). A convenience sampling method was used which is a non-probability sampling technique as most the sim studies used the same technique (Cristensen, et al. 2012; Saunders, Lewis, Thornhill, 2012). Among them, 82% of the participants were enrolled in BBA and 49% were in their first year of education. The

sample of 272 can make us 95% confident about our results with an error margin of ± 6 .

3.2. Measure

The Motivated Strategies for Learning Questionnaire (MSLQ) is a self-report tool designed to measure learners' motivational orientations and their usage of different learning strategies for the course. The MSLQ incorporates two sections; Motivation Section (Scale) and Learning Strategies Section (Scale). Each section is further divided into components and each of the components has several subscales. The Motivation Section has three components; Value, Expectancy, and Effectiveness. The value component is further divided into three subscales; Intrinsic Goal Orientation, Extrinsic Goal Orientation, Task Value. The expectancy component has two subscales; Control Beliefs, Self-efficacy for Learning, and Performance. Third, the Effectiveness component has one subscale that is Test Anxiety. The Learning Strategies Section has two components; Cognitive and Metacognitive Strategies and Resource Management Strategies. The first component in the strategies scale has five subscales i.e., Rehearsal, Elaboration, Organization, Critical Thinking, Metacognitive Self-regulation.

Whereas the second component in the strategies scale comprises four subscales i.e., Time and Study Environment, Effort Regulation, Peer Learning, Help-Seeking

3.3. Statistical analysis

To find out the reliability of the scale on the normative data, Cronbach's alpha was calculated. Path analysis was run to regression weights of subscales items to see if they are loaded onto their respective components appropriately. Path analysis using Amos will also determine the relationship between two components of the scale.

Table.2 results represent the calculation of reliability and validity. According to Hair et al., (2010), composite reliability of 0.7 or more establishes the instrument's reliability and a value of 0.5 or greater defines the convergent validity; while the greater value of MSV than AVE defines the discriminant validity.

This analysis establishes the local norms and appraises the scale factors in specific samples and cultures. Different values from the basic scale statistics may display the cultural differences. However, the scale reliability other than Cronbach's alpha was established. Gender differences and effect size was estimated using Cohen's D.

4. Results

4.1. MSLQ is Valid For Students of Higher Education In Pakistan

Results from the administration of MSLQ on a sample from the local population suggest that the scale is reliable (Table 1) and statistically appropriate to be used on the local population. MSLQ data is normative to this society. The scale is reliable with 0.87 alpha for this sample. Scale items define the criterion well with appropriate reliabilities that correspond to [holistic] scale reliability.

Table.1. Reliability [Cronbach's alpha] and Item Total Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.876	15
Item-Total Statistics	

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Intrinsic Goal Orientation	-.0163	71.589	.587	.866
Extrinsic Goal Orientation	-.0117	72.103	.543	.868
Task Value	-.0204	70.327	.670	.862
Control of Learning Beliefs	-.0338	72.895	.505	.870
Self-efficacy. for Learning n Perform	-.0363	69.972	.682	.861
Test Anxiety	-.0403	79.720	.111	.887
Rehearsal	-.0699	71.426	.633	.864
Elaboration	-.0579	69.919	.710	.860
Organization	-.0523	71.271	.622	.864
Critical Thinking	-.0267	71.649	.591	.866
Metacognitive Self-Regulation	-.0530	69.766	.710	.860
Time n Study Environment	-.0210	73.609	.478	.871
Effort Regulation	-.0634	75.992	.323	.878
Peer Learning	-.0497	73.163	.494	.870

Note: Calculated on z-scores. Items are subscales within the domain.

Source: Author's own elaboration

Reliability and validities were established in table 2, where reliability, lower and upper bounds of coefficient, MSV, AVE, and CR were calculated on the extracted regression weights.

Table.2. Reliability and Construct and Discriminant Validity

Exogenous	Mean	S.D.	Reliability	Coefficient	MSV	AVE	CR
Value	161.8	23.94	0.77	0.38 - 0.48	0.51	0.52	0.86
CMS	245.7	35.32	0.88	0.85 - 0.92	0.51	0.52	0.90

Note: S.D.: Standard deviation; MSV: maximum shared variance; AVE: Average Extracted Variance; CR: composite reliability

Source: Author's own elaboration

Each subscale shows good reliability to be on the MSLQ scale.

Table.3(a). Standardized Regression Weights: (Group number 1 - MSLQ1)

Subscales		Component	Estimate
Intrinsic Goal Orientation	<---	Value	0.697
Extrinsic Goal Orientation	<---	Value	0.620
Task Value	<---	Value	0.828
Control of Learning Beliefs	<---	Value	0.570
Self-efficacy for Learning n Performance	<---	Value	0.847
Test Anxiety	<---	Value	0.754
Rehearsal	<---	Cog and Metacog Strategies	0.807
Elaboration	<---	Cog and Metacog Strategies	0.712
Organization	<---	Cog and Metacog Strategies	0.700
Critical Thinking	<---	Cog and Metacog Strategies	0.823
Metacognitive Self-Regulation	<---	Cog and Metacog Strategies	0.665
Time n Study Environment	<---	Cog and Metacog Strategies	0.755
Effort Regulation	<---	Cog and Metacog Strategies	0.650
Peer Learning	<---	Cog and Metacog Strategies	0.654

Intrinsic Goal Orientation	<---	Cog and Metacog Strategies	0.695
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Table.3(b). Correlations: (Group number 1 - MSLQ1)

	Estimate
Cognitive and Metacognitive Strategies <--> Value Component	0.713

Note: Standardized regression weights for all [15] subscales. Reliability between two components [Cognitive and Metacognitive Strategies].

Source: Author’s own elaboration

Regression weights (Table 3a) of each subscale are reasonable on most subscales. However, subscales metacognitive self-regulation, time and study environment, effort regulation, and peer learning have relatively lower regression weights.

Both components are appropriately correlated (Table 3b). Path analysis depicts that almost all the subscales were loaded onto their respective components well with statistically significant regression weights. The relationship between the two components of the scale is appropriate. This analysis was just to establish the local norms and appraise the scale factors in specific samples and cultures. Different values from the basic scale statistics may display the cultural differences. However, the scale reliability; other than Cronbach's alpha, was established.

Table.4. Model fit-indices for MSLQ on the local population

Chi Sqr	P	CFI	RMSEA	TLI	NFI
266	0.00	0.888	0.056	0.849	0.844

Note: CFI-comparative fit index | RMSEA – root mean square error of approximation | TLI – Tucker-Lewis index | normed fit index

Source: Author’s own elaboration

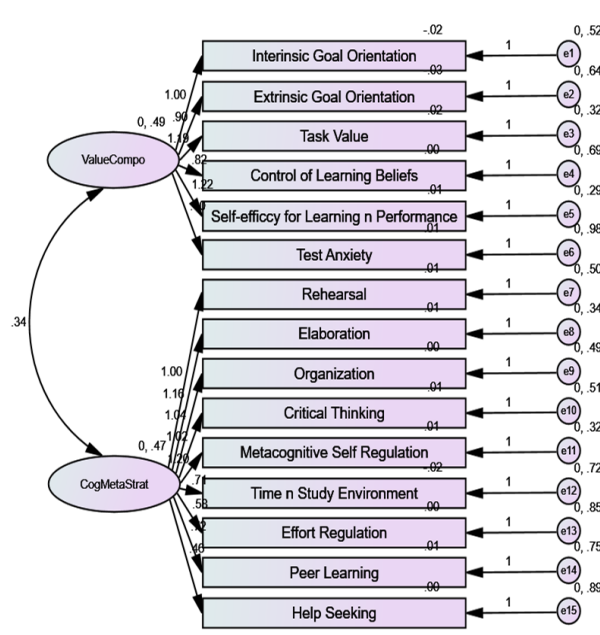


Figure.1: Path diagram with weights, covariance, and correlations
Source: Author’s own elaboration

Table 4 depicts the model fit values on their cut-off markers. Model is a relative fit with CFI: 0.888|TLI:0.849|NFI:0.844. RMSEA is 0.056 is the best fit. However, CFI, TLI, and NFI are showing a poor fit on SEM indices cut-offs. A low threshold on NFI makes the normative index questionable and suggests that cultural acceptance of the scale items is required to drag to a good fit from a marginal [poor] fit.

4.2. The Relationship Between Self-Regulated Learning And Students’ Grades

Table.5. Correlations Between Subscales And CGPA With Standard Deviation And Mean

	n	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1 CGPA	272	2.622	0.728	-																
2 Intrinsic Goal Orientation	272	-0.018	1.009	.089	-															
3 Extrinsic Goal Orientation	272	-0.025	1.023	.212**	.381**	-														
4 Task Value	272	-0.021	1.016	.190**	.587**	.480**	-													
5 Control of Learning Beliefs	269	0.000	1.015	.159**	.429**	.397**	.471**	-												
6 Self-efficacy for Learning	272	-0.014	1.017	.222**	.584**	.567**	.706**	.455**	-											
7 Test Anxiety	271	0.010	0.993	.057	.068	.255**	-.008	.211**	-.016	-										
8 Rehearsal	272	0.006	0.986	.204**	.340**	.329**	.448**	.327**	.424**	.090	-									
9 Elaboration	272	0.013	0.987	.240**	.387**	.356**	.471**	.279**	.474**	.119*	.510**	-								
10 Organization	272	0.003	0.997	.157**	.370**	.286**	.383**	.301**	.389**	.102	.627**	.543**	-							
11 Critical Thinking	272	-0.010	0.997	.186**	.310**	.284**	.380**	.237**	.388**	.096	.468**	.650**	.458**	-						
12 Metacognitive Self-Regulation	271	0.010	1.002	.255**	.450**	.297**	.513**	.359**	.445**	-.001	.560**	.666**	.598**	.579**	-					
13 Time n Study	272	-0.021	0.979	.271**	.303**	.321**	.389**	.219**	.417**	-.063	.296**	.384**	.362**	.251**	.453**	-				
14 Environment Effort Regulation	272	0.005	1.009	.197**	.229**	.172**	.268**	.023	.272**	.120*	.262**	.323**	.208**	.173**	.405**	.411**	-			
15 Peer Learning	272	0.006	1.001	.084	.296**	.282**	.331**	.312**	.420**	.122*	.373**	.407**	.343**	.423**	.335**	.115	.061	-		
16 Help Seeking	272	0.000	0.997	.018	.192**	.164**	.136*	.186**	.138*	.110	.170**	.296**	.200**	.217**	.236**	.127*	.081	.368**	-	

Source: Author’s own elaboration

Table 5 shows a significant relationship of CGPA of students with 12 subscales. This table also depicts the relationships among scale variables to be statistically significant for the normative appropriateness. Interesting and meaningful relationships were found between task value and intrinsic goal orientation – this makes sense when a student has the intrinsic motivation to learn s/he may put extra value to the task; Similarly, self-efficacy is related to task value and can be interpreted as the first relationship. Critical thinking and elaboration are related and this relationship is also making sense as a person will only be able to elaborate on things if it thinks critically, and with a similar perspective self-regulation is related to elaboration, self-regulation is related to organization, and critical thinking.

5.3. The Difference In Scores On MSLQ Between Genders

Table.6. Gender effect on the MSLQ (subscales) with effect size.

MSLQ Subscales	Female		Male		t(270)	p	Cohen's D
	M	SD	M	SD			
Intrinsic Goal Orientation	.243	1.050	-.141	.968	2.975	.003	.023
Extrinsic Goal Orientation	.236	1.018	-.148	1.005	2.931	.004	.023
Task Value	.220	1.049	-.134	.982	2.714	.007	.021
Control of Learning Beliefs	.283	.991	-.135	1.001	3.211	.001	.026
Self-efficacy for Learning n	.153	1.021	-.093	1.009	1.864	.063	.015
Performance							
Test Anxiety	.143	1.014	-.053	.979	1.521	.129	.012
Rehearsal	.209	1.060	-.089	.937	2.347	.020	.018
Elaboration	.167	1.017	-.059	.967	1.765	.079	.014
Organization	.156	1.020	-.068	.981	1.734	.084	.014
Critical Thinking	.022	1.040	-.025	.979	.366	.715	.003
Metacognitive Self-	.303	1.008	-.126	.973	3.345	.001	.026
Regulation							
Time & Study Environment	.290	.980	-.167	.947	3.671	.000	.028
Effort Regulation	.261	1.057	-.116	.965	2.915	.004	.023
Peer Learning	.053	1.033	-.017	.987	.539	.590	.004
Help-Seeking	.123	.990	-.058	.998	1.403	.162	.011

Note: M - mean, SD - Standard deviation. Values of MSLQ subscales are shown for both the genders as well as the results of the t test (assuming equal variance) along with Cohen's d depicting the effect size.

Source: Author's own elaboration

Table 6 represents the effect of gender on subscales/factors. No difference (Cohen's D) was found in self-efficacy, test anxiety, elaboration, organization, critical thinking, peer learning, and help-seeking. Culturally oriented differences in actual scale statistics are discussed in the discussion. It is necessary to bear in mind that this research depends on a normative sample from a different population with its own cognitive and social construction.

5. Discussion

When professionals interested to understand the learning process and learner's role in it realized that learning happens through an interaction of various internal and external sources, the Motivated Strategies for Learning Questionnaire (MSLQ) was developed by Pintrich et.al (1991, 1993). Since its development, it has always been very popular among researchers who were interested in studying self-regulated learning based on its capability of extensive exploration of multiple latent factors that contribute to the self-regulated learning of students.

The present study initially was designed to explore the relationship between students' self-regulated learning and academic performance in the higher education context. During the literature review, it was identified that MSLQ is the scale that is widely used to measure students' self-regulated learning. However, it appeared that psychometric studies on MSLQ in the higher education sector in the Pakistani context were quite limited. Only one such study by Nausheen, (2016) was found that measured only the motivation subscale of MSLQ. So, psychometrics of the Motivated Strategies for

Learning Questionnaire was made one of the chief objectives of this study.

This section further discusses the results of the present study, following the limitations and implications of findings.

5.1. Establishing the Reliability, Normative Validity and correlation between motivation and strategy scales

Going through the scale description was necessary to understand the process of normative validation and discrepancies in findings; between original scale data and this research. MSLQ depends on normative social and personal approaches to problem-solving. Therefore, the operational definition of structure may change from culture to culture.

From our analyses, it emerged that the classic version of the MSLQ is a reliable and valid instrument to assess university students' motivational beliefs and learning strategies in the Pakistani context. Reliability values of the subscales were, in fact, from good to optimal. All subscales showed reliable scores to be kept in the MSLQ scale. When Regression weights of each subscale were calculated through path analysis, except relatively lower regression weights of metacognitive self-regulation, effort regulation, time and study environment, and peer learning; all other subscales showed reasonable weights. Further, subscales measuring the motivation component and learning strategies component showed significant correlations. Path analysis portrays that maximum subscales were loaded onto their components effectively with statistically significant regression weights. Showing appropriate factor loadings, correlations, and reliabilities the scale fails to establish good fits on SEM as a model with low CFI, TLI, and NFI threshold. Low NFI suggests that subscale items need to be more culturally fit. Therefore, this scale needs a rework on item generation to be used successfully in our culture.

5.2. Significant Subscales of MSLQ

Peer learning that is defined as, "collaboration with one's peers to clarify course material" has the lowest score relatively. It may be because students in this sample were from a professional university therefore, may be competitive and if so, there would be a curtailed sense of sharing the information that is going to set the competitive edge. Metacognitive self-regulation, effort regulation, and time and study environment are relatively dependent on each other. Regulation of cognition refers to, "the awareness, knowledge, and control of cognition". This is a personal characteristic that grows with learning about self and practicing integration into the environment. Therefore, this personal characteristic needs guidance and dimensionality for the learner to develop. Whereas, effort regulation that is, "...students' ability to control their effort" relies on learned effectiveness and the availability of the appropriate environment for study; as it is defined by time and study environment that is, "time management involves scheduling, planning, and managing one's study time ...the learner's study environment should be organized, quiet, and relatively distraction-free". Availability of a quiet and relatively distraction-free environment in a crowded household of a 30 million population city (Pakistan Bureau of Statistics) is difficult.

5.3. Relationship between student CGPA and MSLQ-subscales

Statistically significant correlations were found among eleven subscales and CGPA. However, the stronger correlation was between CGPA and 'Time and Study

Environment'. The results of this study are in congruence with other studies exploring the same agenda. For example, A study conducted on teachers in Turkey by Cebesoy (2013) concludes that pre-service science teachers who had better academic records in physics subjects scored higher on the self-efficacy scale measuring learning beliefs. Another study presented by Savoji (2013), which evaluated the relation of motivation and learning strategies with academic achievement of students enrolled in traditional and virtual courses offered at the university level, reports that motivational strategies as compared to motivation can forecast more discrepancy of academic achievement in a virtual group than in a traditional group. Specifically, in the traditional group, task value and self-efficacy and in virtual group test anxiety had a significant role in predicting academic achievement. Zhang, Wang, et al. (2021) studied college students of China for the bidirectional longitudinal correlations between their academic performance and achievement goals; results of this study revealed positive reciprocal relation of extrinsic goals with academic achievement, and no relationship was found between intrinsic goal orientation and academic performance. Overall, the results of the previously mentioned study support the idea that motivated learning strategies have a connection with academic performance.

5.4. Effect Of Gender On Learning And Strategy Scales

In our study, gender has an impact on eight subscales i.e., intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, rehearsal, metacognitive self-regulation, time & study environment, and effort regulation. Females scored higher in all the above-mentioned subscales. These findings indicate that gender produces an effect on the perceptual processing of integrated information from intra and interpersonal sources. When males lookout for success, they seem to consider different elements than females in the Pakistani context. These results are in contradiction with other cultural contexts. Such as, in one of the studies conducted in Spain where researchers found no difference by gender in both scales of MSLQ (Oliveira, 2016). One more study conducted in Turkey administered MSLQ on teachers and looked for gender differences. They too didn't find differences in motivation and learning strategies concerning gender (Cebesoy, 2013).

5.5. Limitations And Recommendations

It is important to reflect on the limits of the present study so that they can become a starting point for further study in this area. Hence in this paragraph following limitations and recommendations are mentioned. First, the convenience sampling method is used in this study, and data is collected from just one city- Karachi. Therefore, results cannot be generalized to the whole population. However, this small-scale study shows the direction for a large-scale randomized sample study to understand this phenomenon on a larger scale in the Pakistani higher education context. Secondly, this scale is unique in the sense that it can explore the contextual picture of students' standing in terms of motivation and learning strategies because this scale in detail measures each component of learning motivation and self-regulated abilities. This scale can be used to track students' motivation levels and learning

strategies in a specific subject. Other existing scales don't specifically do that. We were unable to use this quality of scale in this study because many of the students wrote all subjects' names they were studying in the semester at the time of data collection. More clear instructions need to be provided at the time of data collection in further studies.

Thirdly, this scale is best fit to be used in longitudinal studies because that will allow experts to understand the changes occurring in students' motivation and learning strategies with time and experiences. Lastly, Strengths and weaknesses of students' motivation and learning strategies can be identified if we study high achievers and underachievers, or low achievers as two distinct groups of students. Based on these findings, interventions can be designed to promote self-regulated learning among underachieving students.

5.6. Implications of The Study

We highly recommend this tool to be used in schools and universities to prepare a portfolio of students that would establish a dimension for further the policy, however, this scale needs an overhaul to be completely functional profiles will give insight to teachers, educators, and counselors about each student's strengths and weaknesses that promote or hinder academic performances of students; then. If learning disabilities are present, they can also be identified at early stages and necessary measures can be taken to effectively handle issues at the right time through the use of this scale in primary classes. Further, students' issues with motivations can be resolved through counseling, as these beliefs are not stable traits but can improve with proper guidance and counseling if deteriorated because of any social or emotional pressure. Moreover, customized sessions such as goal setting, organizing time and study environment, or effective study habits can be offered to these students as well. During these sessions' students can take part in the discussion and a fruitful peer learning process and mentoring relationship can be initiated. Furthermore, the students that feel helpless and drop studies in between and are later called dropouts can avail facilitation from counseling centers in university to take the final decision. Counselors can show them the light at the end of the tunnel by helping them to step by step resolve their issues such as test anxiety etc. These efforts can increase their resilience on academic grounds.

5.7. Conclusion

Conclusively, the present study contributes to filling the literature gap by establishing psychometric properties of classic versions of MSLQ in the Pakistani context. This study also confirms that students' learning strategies and motivation have an impact on academic outcomes and considerable gender difference prevails in terms of motivation and learning strategies in Pakistani students.

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