

# Motivation to Use Self-Regulated Learning Strategies in Learning Management System amongst Science and Social Science Undergraduates

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## Abstract

The purpose of this study is to determine students' levels of self-regulated learning by adjusting Motivated Strategies for Learning Questionnaire (MSLQ) developed by (Pintrich et al., 1993). This study involved 436 undergraduate students. The validity of instrument used was checked by convergent validity and discriminate validity in Structural Equation Modeling. The reliability of scale was measured by internal consistency analyses whilst students' levels of self-regulated learning detected by descriptive analyses involving percentage, frequency, means, t-tests and standard deviation. As a result it can be concluded that MSLQ is recognized as a valid and reliable scale in order to examine levels of self-regulated learning among university students in Malaysia. Besides, the students' self-regulated learning strategies are found to be generally in the middle range; their highest level of skills being Effort regulation, whereas the lowest skill is Metacognitive strategies. The students' level of self-regulated learning in social sciences faculties was significantly lower than students in science faculties.

**Keywords:** self-regulated learning, scale development; validity, reliability, LMS environment

## 1. Introduction

The rate of using learning management system LMS in higher education has been increased (Gomez, Wu, & Passerini, 2010). The interactive learning environment, supported by social cognitive and interaction theory that both point to student-centered learning (Zeng & Takatsuka, 2009). Evidence indicates that utilizing the Internet or any modern technology automatically cannot lead to better learning (Kember, McNaught, Chong, Lam, & Cheng, 2010). The e-learning system requires the students' self-regulated learning strategies (SRL) to engage in multiple episodes (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2011; Greene & Azevedo, 2009). For this reason, SRL skill is a vital factor for learner successful, especially in e-learning system (Bol & Garner, 2011). Self-regulated learning is referred to "an active, practical process in which learners determine goals for process of learning and to monitor, regulate their cognition, motivation, and behavior, guided by their goals and the contextual characteristics of the learning environment" (Pintrich, 2000, p. 453). Thus, students are encouraged to become active participants in learning, via establishing personal goals, selecting and modifying their learning strategies, and reflecting on the effectiveness of their learning strategies (Clear & Zimmeraman, 2012).

However, SRL is identified a process that students employ across various domains or circumstances; several empirical researches have investigated how various constituents of SRL might be different as a result of contextual differences. Different results were obtained when comparing between field of study and SRL level. The present study seeks to address this difference by exploring two components of motivation and SRL strategies among two various academic disciplines. Particularly, this study aims to investigate whether level of students' motivation and use of SRL strategies varies across domains.

## 2. Literature Review

Based on literature, students' discipline act as moderator variable in students' perceptions of learning environment, motivation to learn, and using learning strategies (Cleary & Chen, 2009; Crede & Philips 2012; Judd, 2009; Ghosh 2011; Kauffman, 2004; Artino, 2009). Therefore, the level of students' motivation and learning strategies are possible to be somewhat different for various classes. In this case, Kramarski and Gutman, (2006) found that math students apply more critical thinking and help-seeking behaviors, because of they deal with difficult content. Furthermore, students need more synchronous and asynchronous interaction for help seeking to solve a problem. Whereas, other courses might not need collaboration and help seeking strategies and students prefer to learn in their own and need more intrinsic motivation. In other hand, some courses are based on different instructional purposes such as problem-based learning and research-based project that seems to stimulate more motivation, and using learning strategies among students. Thus, this study looked at science and social science undergraduate students' perception about PutraLMS learning environment and self-regulated learning strategies. Accordingly, the findings of this study may contribute to design an effective learning environment that enhance students' motivation to learn and using learning strategies in different contexts.

The levels of motivational components and use of learning strategies depends on features of the task or domain (Wolter & Pintrich, 1998). Zimmerman (1994) argued that the context of classroom has a key role to facilitate SRL. Classroom instructions cause students choose various learning strategies to perform tasks, and giving them different opportunities for developing and using SRL strategies. Moreover, Wolter and Pintrich, (1998) conducted study to find out the effect of classroom differences on students' motivation and self-regulated learning among different subjects namely; English, social studies, and mathematics. The analysis of the repeated measures ANOVA revealed that self-efficacy was significantly different in various disciplines and self-efficacy had the highest score in English compared to social studies and mathematics. Contrary results obtained from other case study conducted by Virtanen and Nevgi, (2010). The researchers examined students' differences in usage of SRL strategies in various disciplines with 1248 undergraduate students. The results indicated that there were minor mean differences in sub-dimensions of SRL among the diverse disciplines.

In this same area, Niemi, Nevgi, and Virtanen (2003) found statistical significant mean differences between different disciplines on anxiety which measured by a self-assessment instrument based on MSLQ. Precisely, the students studying at the faculty of technology, science, and education were less anxious and employed less self-assessment strategies comparing to students of forestry, humanities, agriculture behavioral and sciences.

In early studies carried out by Maurer, Allen, Gatch, Shankar, Sturges, (2013) examined students' academic motivation and effort across human anatomy and physiology (HAP), physics, and nutrition disciplines. The results of multiple regression analysis revealed that motivation subscales were significantly different among students enrolled in three course disciplines. Specifically, students in nutrition major will report higher levels of intrinsic motivation and lower levels of extrinsic motivation. Moreover, the higher levels of intrinsic and extrinsic motivations associated with higher levels of study habits, efforts, and final grades. In the same area of study, Schwinger and Stiensmeier-Pelster, (2012) found that contexts of different disciplines was moderator of motivational strategies. The students perceive the characteristics of mathematics, German, and English differently. Students identified that math course required more effort and challenge compared German or English. Subsequently students are less motivated to pursue a particular task and learning efforts.

## 3. Aim of Study

Based on the literature, the research questions of this study are:

H<sub>1</sub>: Is Motivated Strategies for Learning Questionnaire (MSLQ) valid and reliable to measure SRL strategies.

H<sub>2</sub>: To what extent is the students' level of motivation and use of SRL strategies

H<sub>3</sub>: Are there any differences in the levels of motivation and using of self-regulated learning strategies between science and social science students.

## 4. Methodology

The instrument of this study has been tested for reliability and validity in Structural Equation Modeling by using Cronbach alpha ( $\alpha$ ) values and composite reliability for each factor and CFA measurement model. Moreover, this study used mean comparison t-test independent analysis (Korkmaz & Kaya, 2012) in order to test the moderator variable as students' differences in motivation and use SRL strategies between science and social science disciplines.

#### 4.1 The Sample of Study

The population of this study was 13000 undergraduate students belonging to 15 faculties at university Putra Malaysia (UPM). The respondents of this study consisted of 436 undergraduate students from 6 faculties of science and social science who have registered in LMS courses. The frequency of students regarding to department, years of study and gender is presented in following Table 1.

Table. 1 The Distribution of Study Group with respect to Gender and Department, years of study

group	Department	Frequency	Percentage
Science	Engineering	95	21%
	Agriculture	78	17.9%
	Science	113	25.9%
Total		286	65.6%
Social	Modern language	51	11.7%
	Economic	49	11.2%
	Education	50	11.5%
Total		150	34.4%
Gender	Female	289	66.3%
	Male	147	33.7%
Year of study	1 & 2 years	143	55.8%
	3 & 4 years	192	44.2%

#### 4.2 Instrument of the Study

This study used Motivated Strategies for Learning Questionnaire (MSLQ) developed by (Pintrich et al., 1993) to measure students' SRL. MSLQ instrument captures the general aspects of students' self-regulation of learning in a psychometrically reliable way (Cleary & Zimmerman, 2012; Credé, & Phillips, 2011). MSLQ is based on social cognitive view that represents students' active processor of information. MSLQ instrument has been used both in face to face and e-learning environment among many countries (Credé & Phillips, 2011).

In this study, MSLQ is divided into two parts: motivation concept with 18 items and SRL strategies with 30 items drawn in 7-point liker scales. Pintrich emphasized on the importance of motivational processes of self-regulation. Motivation is a key factor as a separate area of criteria for SRL strategies. Motivational variables interact with cognitive, behavioral, and contextual factors to affect self-regulation (Zimmerman & Schunk, 1989). This study considered motivation concept in three dimensions (intrinsic goal orientation, task value and self-efficacy). Also, this study measured SRL strategies into two dimensions as metacognitive and resource management strategies. The metacognitive learning strategies, measured by one large subscale relates to the use of strategies that help students control and regulate their own cognition. This subscale consists of planning, monitoring, and regulating that result in optimum academic performance (Montalvo & Torres, 2004; Lee, 2003). The resource management comprised of environment and time management, peer learning, effort regulation, and help seeking constructs. The self-regulated learners are capable of managing the available resource and are able to adapt to learning situation (Credé & Phillips, 2011).

#### 5. Findings

The reliability and validity of MSLQ was measured in each observed variable by CFA measurement model, for factor loading, Cronbach's alpha (CA), composite reliability, convergent validity and discriminant validity for every latent variables of study (Ho, 2006). The results of CFA analysis showed a very satisfying overall model fit in this case as all the fit indices satisfy their cutoff value (RMSEA= .076, CMIN/DF= 3.518, RMR= 0.067, CFI= .944, IFI= .944, GFI= .881, NFI= 0.915).

The factor loading of all items of the questionnaire were more than 0.7 threshold value except for metacognitive items 1 and 8 (0.40; .39) and time managements' items 7 and 8 (0.13; 0.24) which were subsequently deleted from the questionnaire. Table 2 lists standardized factor loading, composite reliability (CR), Cronbach's alpha (CA), and Average variance Extracted (AVE) for each dimension of SRL constructs. It shows that all CR and CA values are higher than the threshold value of 0.7, which indicates adequate internal consistency (Hair et al., 2010). The measurement model of learning motivation also shows satisfactory indicator reliability because all the standardized factor loadings are above 0.70. Likewise, Table 3 shows that AVE for all variables was

significantly higher than 0.5, thus, the measurement model provides acceptable convergent validity (Urbach, Smolnik, & Riempp, 2010).

Table 2. Measurement Model of MSLQ Results of First-order CFA

Construct	Parameter standardized loading	Composite reliability (CR)	Cronbach's alpha (CA)	Average variance Extracted (AVE)
Intrinsic goal		.890	.883	.670
INC1	.760			
INC2	.838			
INC3	.878			
INC4	.794			
Task value		.910	.909	.627
TAS1	.763			
TAS2	.800			
TAS3	.791			
TAS4	.806			
TAS5	.803			
TAS6	.789			
Self efficacy		.987	.940	.650
SEL1	.784			
SEL2	.799			
SEL3	.829			
SEL4	.826			
SEL5	.829			
SEL6	.785			
SEL7	.785			
SEL8	.815			
Metacognitive		.940		.611
MTG2	.728			
MTG3	.804			
MTG4	.772			
MTG5	.757			
MTG6	.818			
MTG7	.815			
MTG9	.824			
MTG10	.811			
MTG11	.791			
MTG12	.685			
Time of study management		.911	.910	.632
TIM1	.810			
TIM2	.812			
TIM3	.799			
TIM4	.771			
TIM5	.803			
TIM6	.772			
Effort regulation		.881	.881	.650
EFT1	.801			
EFT2	.838			
EFT3	.774			
EFT4	.811			
Help seeking and peer learning		.900	.900	.601
HP1	.721			
HP2	.788			
HP3	.832			
HP4	.744			
HP5	.812			
HP6	.747			

Finally, Table 3 defined the discriminant validity among inter dimensions of variables by using the diagonal correlation matrix for the measurement model of motivation and learning strategies. The given AVE for all construct was larger than the squared correlation of those three dimensions of motivation and learning strategies. Therefore, the dimension was truly a distinct frame from other dimensions and discriminant validity was satisfied (Fornell & Larcker, 1981).

Table 3. Discriminant validity for the final measurement model

Construct	MOT	MTG	RSM
MOT	(.653)		
MTG	.172	(.611)	
RSM	.242	.378	(.619)

Off-diagonal: squared correlation between constructs; Metacognitive (MTG); Motivation (MOT); resource management (RSM)

This study also measured student level of motivation and SRL strategies among undergraduate students based on a study with the same objectives conducted by Korkmaz & Kaya, (2012). Standard deviation, frequency, means, and t-tests were used to determine the levels of self-regulated learning. The amount of  $p < 0.05$  significance level is considered as a differentiation analyses.

As shown in Table 4, students' scores in motivation and use of self-regulated learning strategies change between 1.38 and 6.78, the mean was 4.46. Results show that more than (58.6%) of the students have medium level, 27.1% have high and 14.24% possessed low level self-regulation strategies. Therefore it has been concluded that students' motivation and use of self-regulated learning strategies are at a medium level. The factor with the highest average is "task value" (4.60), the lowest factor is "time and environment management" (4.39). The highest level factor in high group is "task value" (35.6%), the lowest factor being "metacognitive" (23.2%). In the medium group, the highest factor is "metacognitive" (67.4%), the lowest being "task value" (51.4%). The highest ratio factor in low group is "intrinsic goal orientation" (16.7%) and the lowest, "metacognitive" (12.4%). Hence it can be noted that the most frequent SRL strategies used is metacognitive strategies (67.4%) by the medium level group.

Table 4. Students' self-regulated learning levels

Factors	N	Mean	SD	Min	Max	Levels (f) %					
						Low	Medium	High			
INC	436	4.46	.680	1.50	7	73	16.7%	225	51.6%	138	31.7%
TAS	436	4.60	.660	1.50	7	57	13.1%	224	51.4%	155	35.6%
SEL	436	4.45	.632	1.38	6.88	65	14.9%	256	58.7%	115	26.4%
MTG	436	4.41	.565	1.17	6.50	57	12.4%	249	67.4%	88	20.2%
TIM	436	4.39	.607	1.33	6.67	63	14.4%	272	62.4%	101	23.2%
EFT	436	4.41	.605	1.50	6.75	58	12.8%	270	61.9%	110	25.2%
HP	436	4.53	.644	1.33	6.67	67	15.4%	249	57.1%	120	27.5%
Total		4.46	.627	1.38	6.78		14.24%		58.6%		27.1%

Intrinsic goal orientation (INC); task value (TSK); self-efficacy (SEL); metacognitive (MTG); time management (TIM); effort regulation (EFT); help seeking and peer learning (HP)

Table 4 showed that the most frequent response medium, in other word, the students' tendency to choose the mid-point or neutral scale of the questionnaire. According to Moser & Kalton (1972, p 344) mid-point or odd number option lead respondent to persist in middle option to get to the end of the questionnaire and thus it provides uninformative data. Thus, this study deleted number 4 from the scale of the questionnaire which is the mid-point to get a more conclusive data. Next, this study measured students' differences in SRL strategies between science and social science group. Table 5 depicted that students' SRL strategies are significantly different with respect to course discipline.

Based on the data obtained from mean comparison t-test, there was significant difference between students effort regulation ( $t= 3.651$ ;  $p<0.001$ ), task value ( $t = 2.261$ ;  $p<0.05$ ), intrinsic goal orientation ( $t= 2.057$ ;  $p<0.05$ ) and time management ( $t= 2.010$ ;  $p<0.05$ ). Therefore it can be concluded that discipline have moderate influence on level of students' SRL. Apparently discipline didn't have significant effect on students' level of SRL strategies in other constructs of SRL strategies such as Self-efficacy, Metacognitive, Help seeking and Peer learning strategies.

Table 5. The effect of discipline on students' self-regulated learning strategies

Variables	Group	N	Mean	SD	t	sd	P																																																																				
INC	Science	286	3.84	.855	-2.057	.088	.040																																																																				
	Social	150	3.70	.906				TAS	Science	286	3.92	.915	2.261	.090	.024	Social	150	4.13	.894	SEL	Science	286	3.91	.892	-1.749	.091	.081	Social	150	3.75	.759	MTG	Science	286	3.90	.795	.310	.083	.757	Social	150	3.88	.885	TIM	Science	286	3.683	.877	2.010	.087	.045	Social	150	3.508	.846	EFT	Science	286	3.93	.776	3.651	.080	.000	Social	150	3.63	.828	HP	Science	286	3.97	.855	-1.028	.087	.306
TAS	Science	286	3.92	.915	2.261	.090	.024																																																																				
	Social	150	4.13	.894				SEL	Science	286	3.91	.892	-1.749	.091	.081	Social	150	3.75	.759	MTG	Science	286	3.90	.795	.310	.083	.757	Social	150	3.88	.885	TIM	Science	286	3.683	.877	2.010	.087	.045	Social	150	3.508	.846	EFT	Science	286	3.93	.776	3.651	.080	.000	Social	150	3.63	.828	HP	Science	286	3.97	.855	-1.028	.087	.306	Social	150	3.88	.889								
SEL	Science	286	3.91	.892	-1.749	.091	.081																																																																				
	Social	150	3.75	.759				MTG	Science	286	3.90	.795	.310	.083	.757	Social	150	3.88	.885	TIM	Science	286	3.683	.877	2.010	.087	.045	Social	150	3.508	.846	EFT	Science	286	3.93	.776	3.651	.080	.000	Social	150	3.63	.828	HP	Science	286	3.97	.855	-1.028	.087	.306	Social	150	3.88	.889																				
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	Social	150	3.88	.885				TIM	Science	286	3.683	.877	2.010	.087	.045	Social	150	3.508	.846	EFT	Science	286	3.93	.776	3.651	.080	.000	Social	150	3.63	.828	HP	Science	286	3.97	.855	-1.028	.087	.306	Social	150	3.88	.889																																
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	Social	150	3.63	.828				HP	Science	286	3.97	.855	-1.028	.087	.306	Social	150	3.88	.889																																																								
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	Social	150	3.88	.889																																																																							

## 6. Discussion

MSLQ has been widely adapted into Malaysian context to identify students' motivation and use of self-regulated learning levels. The findings obtained from CFA measurement model showed that the obtained model is confirmed via data and actually reflected the theoretical latent construct of those items they are designed to measure (Byrne, 2010). MSLQ is recognized to have high validity and reliability that can be applied in e-learning environment and students' level of SRL at Malaysian university.

Generally, the level of students' motivation and use of SRL strategies stands in middle level. The highest level was 'task value', whereby 35% of participants reported had high task value of motivation. The lowest level was metacognitive strategies (12.4%) with a mean of 4.41 the average mean being 4.46. This study removed number 4 from the 7-point Likert scales from the questionnaire and then compared the mean difference between science and social science students in LMS learning environment.

The findings indicated that students effort regulation, task value, intrinsic goal orientation, and time management showed significant difference between science and social science student. Conversely disciplines showed moderate effect on students SRL strategies (Maurer et al., 2013; Schwinger, & Stiensmeier-Pelster, 2012; Virtanen & Nevgi, 2010; Niemi et al., 2003; Wolter & Pintrich, 1998).

Although Korkmaz and Kaya, (2012) found significant difference between all dimensions of construct of online self-regulated learning in science and social science, the result of this study showed that the mean between science and social science group in Self-efficacy, Metacognitive, Help seeking and Peer learning strategies were quite similar. The findings of this study agrees with the study conducted by Tsai (2009) that found that level of students' online self-regulated learning did not vary much across different faculties. In the same area, Şimşek and Balaban (2010) found that metacognitive strategies and motivation strategies were different among university faculties. Contrarily, Korkmaz and Kaya, (2012) reported that students' online self-regulated learning was different in science, social, and technology group and that students from social departments are significantly lower than those from other departments.

Generally, work on academic tasks, and the nature of the classroom structure play major role on students' (Wolter & Pintrich, 1998). However, according to evidence there were significant differences regarding to level of SRL among teachers, classrooms and academic discipline. It is necessary to examine the external context in student's strategies. According to Wolter and Pintrich, (1998) the various disciplinary areas, (science, English, social studies, mathematics, and foreign languages) relate to different instructional beliefs. Motivation and SRL strategies are critical factors for improved learning achievements and thus an appropriate instructional design is

important. Although students in e-learning environment apply similar SRL strategies as in traditional classroom, they typically encounter distinctive circumstances and manage them somewhat differently (Ku, & Chang, 2011).

## 7. Conclusion

This study covered public university undergraduate students from faculties of education, modern language and communication, economy and management, engineering, science, and Agriculture College. The result of this study showed limited motivation and use of SRL strategies. Therefore, the mean between the two groups was quite equal. Based on literature review and findings from this study, it is not conclusive that type of disciplines has absolute impact on students' motivation and SRL strategies. Thus further studies in related areas are suggested to analyze students' self-regulated learning in different context.

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