Moderating Role of Learning Strategies Between Meta-Cognitive Awareness and Study Habits Among University Students

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The purpose of present study is to examine the role of learning strategies as moderator between meta-cognitive awareness and study habits among university students. Sample comprises of 200 students (100 male students and 100 female students) of various universities of Islamabad and Rawalpindi with age ranging from 18-25 years. In order to assess study variables questionnaires were used included Meta-Cognitive Awareness Inventory (Schraw & Dennison, 1994) measuring two-components of meta-cognition that are knowledge and regulation of cognition. Study habits demonstrated by the students were measured by the Study Habits Inventory (Wrenn, 1941). Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991) which includes motivation and learning strategies scales. In the present study, only the learning strategies section was utilized, which measures the cognitive strategies and resource management strategies. Results revealed positive correlation between research instruments and are also having good reliability. Regression analysis reflected that meta-cognitive awareness predicts study habits among university students. Regression analysis also suggested that learning strategies including resource management strategies and cognitive strategies significantly moderates the relationship between meta-cognitive awareness and study habits. It is also explored gender differences on learning strategies, meta-cognitive awareness and study habits. Future implications of the study were also discussed.

Keywords. Learning strategies, meta-cognitive awareness, study habits

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Basic goal of the learning, guidance and teaching is to safe the educational environment. It has been found that most of the educational crisis like underachievement, absenteeism, stagnation, and academic drop-outs are usually the consequence of acquisition of improper study programs with respect to study time (Raj & Sreethi, 2000). Now a day scholastic and academic achievement has raised various questions for educationists. What are the factors contributing significant role in the promotion of students' academic achievement? It must be noted that modern society cannot be able to attain its purpose of financial development, mechanical expansion and cultural progression without improving the capacity of its citizens. So the main concern of educational struggle is to enhance the academic achievements of students. Academic activities of the pupil are directly associated to learning styles and study habits.

Study habit is having suitable studying schedule existing in a setting which is appropriate for studying (Crede & Kuncel, 2008). Educational psychologists give significant importance to the progress of positive study habits as it is ultimately connected to learning and achievement. Not every learning strategy and study habits leads to success in academics, it would be expected that the probability of better performance is high for the students having good study habits (Nonis & Hudson, 2010). Elias (2005) conducted study on students of accounting course to investigate the effect of two different approaches of studying on students' performance that are deep and surface approach. Deep approach is to build up proficiency in subject matter while surface approach is only to assemble course expectations. Findings of his study showed that course grade has increases while following deep approach but decreases with surface approach. Okpala, Okpala, and Ellis (2000) suggested positive connection between good study habits and activities of economics course.

There are various factors which align one's study orientation like effective time management, note-taking, reading, listening and writing, proper study environment. The most fundamental talk step in child's educating development is the formulation of study strategies that are found to be useful in learning. Learning strategies defined as behaviors and thoughts used by students to process new information by utilizing their existing knowledge. According to Pintrich and Smith (1993), learning strategies are divided into cognitive and resource management strategies. Cognitive strategies consisting of rehearsal and elaboration defined as basic mental activities which are used in the process of storing new information. While, resource management strategies refer as techniques used by students to manage and regulate their time, study environment, and peers in learning. Rehearsal

strategies involve repeating words again and again in order to better recall information. Elaboration strategies facilitate students to store information in their long term memory by establishing associations between items to be learnt. On the other hand, resource management strategy involves study environment and time management. Time management includes managing one's study time; planning and scheduling while study environment defines as setting in which learner complete his assignment or academic tasks. According to Pintrich and Smith (1993), students who affectively manage their duration of study and study setting are more likely to show better performance. The second component of resource management strategy is peer learning that is getting assistance from others in learning. Study conducted on first-year business statistics students reveals that peer learning has positive effect on students' academic achievement (Dancer, Morrison, & Tarr, 2015).

In education, idea of competencies increased the interest in learning strategies, in reality, strategies are perceived as part of the resources that students should be aware and engaged in to be competent (Peters & Viola, 2003; Tardif, 2006).A strategy is basically an approach of learning which reflects the students' way of using information. Dignath and Büttner (2008) conducted in text comprehension meta-analysis on primary and secondary school students and they inferred that guidance for educating cognitive and meta-cognitive strategies are influential, especially when they are connected with meta-cognitive knowledge and meta-cognitive reflection. Indeed, the effective use of the strategy requires a certain level of meta-cognitive knowledge (Björklund, 2005), that is what are the strategies from the student's repertoire and in what situations such strategies should be applied. Thus, meta-cognition performs a vital function in learning (Dignath, Büttner, & Langfeldt, 2008).

Cognitive psychologists have developed various psychological and educational theories, most notably meta-cognitive theory, to assist in promoting academic achievements (Sideridis, Morgan, Botsas, Padeliadu, & Fuchs, 2006). Meta-cognitive processes are defined as "one's understanding regarding one's own cognitive procedures and products . . . the vigorous supervision and substantial regulation of those methods and procedures in connection to the cognitive matter or information on which they bear'' (Flavell, 1976, p. 232). Meta-cognition is discussed by modern studies under two main headings: Meta-cognition knowledge and meta-cognitive control (Nelson & Narens, 1990; Otani & Widner, 2005; Sungur, 2007). Meta-cognitive knowledge defines as one's knowledge about his cognitive strategies and skills, and awareness about what to do in different situations

(Flavell, 1979) while the ability to utilize meta-cognitive knowledge, on the other hand, is called meta-cognitive control which is the second component of meta-cognitive awareness (Ozsoy, 2008). In general, meta-cognition is linked with students' developmental growth and domain capability; mindful organization of learning; capacity to plan, scrutinize, and resolve faults; transmission of rule learning; and capability to adjust their own learning behaviors (Brown, 1987). It was found that if meta-cognitive strategies are implemented consistently and appropriately in the classroom settings, desired outcomes will be occurred (Barry & Messer, 2003; Cooley & Ayres, 2001; Klassen, 2002). Martini and Shore (2008) suggested that students with well-developed meta-cognition strategies showed good academic performance as compared to students with poor meta-cognition skills. Meta-cognition helps students to be strategic in their learning by learning new information instead of relying on studying already learnt information. Meta-cognition is playing significant role in learning, and is found as a strong predictor of academic success (Dunning, Johnson, Ehrlinger, & Kruger, 2003).

To make effective decisions, child should have the capability to differentiate the difficulty level to learn the items which is considered as the primary step for strategy formation during study (Son & Metcalfe, 2000; Son, 2004). Major characteristics of self-regulated learners are effective time management, high self-efficacy, and self-motivation (Ley & Young, 1998). Numerous researches proves that effective study habits involved not only knowledge of appropriate studying techniques and practices, but also self-regulation, self-monitoring and sense of responsibility and perceiving worth in one's own learning (Diseth, 2003; Schmeck, 1979; 1982; Watkins, 1983). Basically, monitoring and control are the two main components of the meta-cognition which occurred during the learning process (Nelson & Narens, 1990). The primary purpose of the current study is to assess the relationship between meta-cognition strategies and study habits. It is hypothesized on the base of existing literature that meta-cognition strategies positively affect study habits as meta-cognition strategies are the amalgam of all basic techniques which helps in the execution of cognitive processes. Students high in meta-cognitive abilities are thought to be better involved in their own learning process, continuous planning and task monitoring and the synchronization between task and study behavior (Zimmerman, 1986). Another objective of the study is to find moderating role of learning strategies on the relationship between meta-cognitive strategies and study habits. Besides these objectives, gender difference is also analyzed on meta-cognition strategies, learning strategies, and study habits.

Method

Hypotheses

To achieve the objectives following hypotheses were formulated:

1. Knowledge about meta-cognitive strategies is positively related to study habits.

2. Regulation of meta-cognitive strategies is positively related to study habits.

3. Cognitive learning strategies work as moderator between meta-cognitive awareness and study habits

4. Resource management learning strategies work as moderator between meta-cognitive awareness and study habits

5. There is a difference between male and female university students on meta-cognitive awareness, study habits and learning strategies.

Instruments

Meta-Cognitive Awareness Inventory (MAI). MAI consists of 52 items rated on 5 point rating scale. High score reflects greater repertoire of meta-cognitive awareness strategies. Meta-cognitive awareness inventory contains two main components meta-cognitive knowledge and meta-cognitive regulation. Knowledge of cognition subscale consists of 17 items with the high score of 85 indicating high meta-cognitive knowledge. Regulation of meta-cognitive knowledge subscale consists of 35 items where high score of 175 indicates greater control on meta-cognitive knowledge. Cronbach's alpha reliability coefficient was .92 and the test-retest index was .88 (Dörnyei, 2007; DeVellis, 2012; Schraw & Dennison, 1994).

Study Habits Inventory. Study Habits Inventory (Wrenn, 1941) is used to determine study habits of students in different ways like, it helps students to identify their study weaknesses, to find particular study habits, for clinical study and individual counseling and information regarding their readiness for study. It consists of 32 items rated on three point rating scale ranging from 1 (Rarely or never true) to 3 (Often or always true). Cronbach's alpha reliability coefficient was .89 (Wrenn, 1941).

Motivated Strategies for Learning Questionnaire (MSLQ). It is designed to measure motivational beliefs and learning strategy of students (Pintrich et al., 1991). Learning strategy subscale consisted of 43 items of this questionnaire is used in the present study. The

learning strategies subscale consists of cognitive strategies and resource management strategies. The cognitive strategies include five factors: Organization, rehearsal, critical thinking, meta-cognition and elaboration. The resource management strategies include four factors: Time and study management, effort management, peer learning and help-seeking.the reported Cronbachs' alpha reliabilities of the scales are between .52 to .80. The factorial structure of the MSLQ was also proved in various studies (Garcia & Pintrich, 1996).

Sample

The sample was comprised of 200 students (100 females and 100 males) from some higher educational institutions of Islamabad and Rawalpindi in Pakistan. Their ages ranged from 18 to 24 year ($M = 21$, $SD = 2.18$). Convenient sampling technique was utilized to acquire sample for the study.

Procedure

Participants were approached after seeking approval from their institutions. All participants of the study were informed about the purpose and significance of the study. They were assured that their responses would be kept confidential and anonymous and used only for the purpose of research. Participants were handed over booklet of questionnaires including Meta-cognition Awareness Inventory (MAI), Study Habits Inventory (SHI) and Motivated Strategies for Learning Questionnaire (MSLQ) in order to assess their level of meta-cognition knowledge and regulation abilities, study habits and learning strategies. Verbal instructions were also provided to respondents along with written directions to respond questionnaires.

Results

Descriptive and Cronbach alpha reliability were computed to assess normal distribution of data and reliability of the scale. Correlation matrix was computed to see the relationship between studied variables. Regression analysis was conducted to determine the effect of meta-cognitive awareness on study habits. Regression analysis served as preliminary analysis before proceeding to moderation. t-test was used to analyze gender difference on studied variables. All statistical analyses were performed using Statistical Package for Social Sciences (SPSS 20).

Table 1

Descriptive Statistics for Study Variables (N = 200)

Variables	k	α	M	SD	Min-Max	Skew	Kurt
Meta-cognitive awareness	52	.89	89.56	8.89	67-104	-.18	-.73
Meta-cognitive knowledge	17	.78	29.12	3.26	20-34	-.32	-.46
Meta-cognitive Regulation	35	.82	60.34	6.35	46-70	-.19	-.85
Learning strategies	43	.91	154.99	21.96	47-208	-.35	.02
Resource management strategies	14	.89	49.72	8.32	14-92	-.18	.59
Cognitive strategies	29	.87	104.54	15.06	29-141	-.39	.27
Study habits	32	.85	58.91	8.44	35-81	.13	.13

Table 1 shows the descriptive statistics for study variables. Findings show that all the measures are internally consistent. Results also disclose that values of skewness and kurtosis are also satisfactory, within given range i.e., -1 to +1.

Table 2

Correlation of Meta-Cognitive Knowledge, Meta-Cognitive Regulation, Resource Management Strategies, Cognitive Strategies and Study Habits (N = 200)

Variables	1	2	3	4	5
1 Meta-cognitive knowledge	-	.67**	.79*	.59**	.69**
2 Meta-cognitive Regulation		-	.49**	.74*	.87**
3 Resource management strategies			-	.82***	.58*
4 Cognitive strategies				-	.57**
5 Study habits					-

*p < .05. **p < .01. ***p < .00.

Table 2 shows the correlation matrix of all the scales. There is significant positive relationship between meta-cognitive knowledge, meta-cognitive regulation, resource management strategies, cognitive strategies and study habits.

Table 3 shows the effect of meta-cognitive knowledge and meta-cognitive regulation on study habits. There are two predictor variables (meta-cognitive knowledge and meta-cognitive regulation) which have an effect on outcome variable (study habits). Meta-cognitive knowledge and meta-cognitive regulation are explaining 37% to 54% variance in study habits.

Table 3

Regression Analyses Predicting Study Habits from Meta-Cognitive Knowledge and Meta-Cognitive Regulation (N = 200)

	Study Habits		95% CI	
	Model 1	Model 2		
Variables	B	B	UL	LL
Constant	32.74[*]	33.57[*]	27.21	38.72
Meta-cognitive Knowledge	.57[**]	.59[**]	0.02	0.60
Meta-cognitive Regulation	.61[**]	.63[*]	0.07	0.76
R^2	.37	.54		
F	54.35[**]	53.89[**]		
ΔR^2		.17		
ΔF		.46		

[*]$p < .05$. [**]$p < .01$.

Moderation analysis was carried out to see the effect of learning strategies on relationship between meta-cognitive awareness and study habits. An interaction between the predictor variable (meta-cognitive awareness) and moderator variable (learning strategies) was studied for an outcome variable (study habits) that might affect the relationship between the two variables. The issue of multicolliniarity was addressed by centering the mean of sample for variable scores and then the relevant interaction term was computed. After computing the interaction terms, multiple regression analysis was conducted to investigate the moderation.

Table 4

Moderating Effect of Resource Management Strategies on Meta-Cognitive Awareness and Study Habits (N = 200)

	Study Habits		
	Model1	Model 2	
Predictors	B	B	95% CI
Constant	28.32[*]	29.57[*]	23.32 - 28.72
Meta-cognitive Knowledge	.36[**]	.39[**]	0.09 - 0.47
Meta-cognitive Regulation	.52[*]	.52[*]	0.03 - 0.57
Resource Management strategies	.17[**]	.19[**]	0.06 - 0.30
Meta-cognitive Knowledge× Resource Management strategies		.13[*]	0.03 - 0.58
Meta-cognitive Regulation× Resource Management strategies		.12[*]	0.03 - 0.52
R^2	.23	.47	
F	45.67[**]	43.73[**]	
ΔR^2		.30	
ΔF		.19	

[*]$p < .05$. [**]$p < .01$.

Table 4 shows the moderating effect of resource management strategies in relationship between meta-cognitive awareness having two components meta-cognitive knowledge and meta-cognitive regulation and study habits. The interaction effect of meta-cognitive knowledge and resource management strategies and the interaction effect of meta-cognitive regulation and resource management strategies has significant moderating effect along with explaining 23% to 47% variance in relationship with study habits ($B = .03^*, .02^*$, $p < .05$, $\Delta R^2 = .30$).

Table 5

Moderating Effect of Cognitive Strategies on Meta-Cognitive Awareness and Study Habits ($N = 200$)

	Study Habit		
	Model1	Model 2	
Predictors	B	B	95% CI
Constant	25.36*	31.33*	21.97 - 30.32
Meta-cognitive Knowledge	.42**	.45**	0.07 - 0.53
Meta-cognitive Regulation	.63*	.64*	0.09 - 0.74
Cognitive strategies	.23**	.22**	0.05 - 0.36
Meta-cognitive Knowledge× Cognitive strategies		.19*	0.09 - 0.55
Meta-cognitive Regulation× Cognitive strategies		.14*	0.07 - 0.59
R^2	.25	.46	
F	55.43**	52.32**	
ΔR^2		.21	
ΔF		.31	

$^*p < .05.\ ^{**}p < .01.$

Table 5 shows the moderating effect of cognitive strategies in relationship between meta-cognitive awareness having two components meta-cognitive knowledge and meta-cognitive regulation and study habits. The interaction effect of meta-cognitive knowledge and cognitive strategies and the interaction effect of meta-cognitive regulation and cognitive strategies has significant moderating effect along with explaining 25% to 46% variance in relationship with study habits ($B = .01^*, .04^*, p < .05, \Delta R^2 = .21$).

Table 6 shows the differences between male and female university students on meta-cognitive knowledge, meta-cognitive regulation, resource management strategies, cognitive strategies and study habits. As the mean column shows that female university students scored higher on meta-cognitive knowledge, meta-cognitive regulation, resource management strategies, cognitive strategies and study habits than male university students.

Table 6

Mean, Standard Deviations and t-Values Along Gender on Meta-Cognitive Knowledge, Meta-Cognitive Regulation, Resource Management Strategies, Cognitive Strategies and Study Habits (N = 200)

	Male (n = 100)		Female (n = 100)				95% CI		Cohen's
	M	SD	M	SD	t(198)	p	LL	UL	d
Meta-cognitive Knowledge	28.89	3.53	29.32	3.01	.84	.04	1.45	.58	0.13
Meta-cognitive Regulation	59.29	6.82	61.27	5.77	1.98	.04	3.95	.06	0.31
Resource Management strategies	48.86	8.52	50.52	8.11	1.26	.02	4.24	.93	0.19
Cognitive strategies	103.38	13.52	105.53	16.28	.89	.03	6.89	2.60	0.14
Study Habits	58.37	8.33	59.50	8.57	.84	.04	1.51	3.75	0.13

Note. CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit.

Discussion

The present study sought to develop a greater understanding of study habits and their relationship with meta-cognitive awareness strategies and learning strategies. "Study habits refer to the tendency of a student to pay continuous attention to acquire knowledge through systematic routines (Khurshid, Tanveer, & Qasmi, 2012)" or can be comprehended as affective study strategies and techniques in time management as well as other resources to achieve academic success (Crede & Kuncel, 2008). Therefore, this study not only extends research on meta-cognition but also assists in the formulation of strategies in order to make study habits more effective. The results of the study highlight the significance of meta-cognitive awareness strategies and learning strategies in the formation of productive study habits.

It was expected that meta-cognitive awareness strategies would be directly related to study habits. Findings supported this hypothesis, revealing that meta-cognitive awareness strategies have positive affect on study habits. These findings are consistent with the previous research conducted on fifth grade students of Turkey suggesting significant relationship between meta-cognition and study habits (Ozsoy, Memis, &Temur, 2009). The process of studying is basically

the process of problem solving. In this process, learners' way of planning, organizing and evaluating the things positively affect their performance. Paris and Winograd (1990) stated meta-cognition as way of enhancing problem solving with the help of cognitive tools. Therefore, study habits need the utilization of various cognitive strategies.

Researchers have argued that learning strategies act as a significant indicator for potential learning performance (Kolb & Kolb, 2005; Sun, Lin, & Yu, 2008). Learning strategies consist of resource management strategies and cognitive strategies. Waweru and Orodho (2014) conducted study on student in Kenya and found that resource management strategies are considered as prerequisite to enhance academic performance. Besides this, cognitive strategies also boost academic achievement. When students constructs knowledge, they usually utilize deep cognitive learning strategies such as structuring of learning content and constructing mental depictions of learning content (Marton & Saljo, 1976). In a descriptive study, Bouffard, Boisvert, Vereau, and Larouche(1995) suggested that those students who were highly oriented towards learning reported frequent use of cognitive strategies and meta-cognitive strategies which resulted in better academic performance. It can be said that goal oriented students adopt cognitive strategies because their main concern is to get self-improvement and real mastery. Therefore, objective of the current study was also to explore moderating role of learning strategies on the relationship between meta-cognitive strategies and study habits. Basically, learning strategies are integrated wholes of learning activities which are carried out by students to attain learning goals (Vermunt, 1992) and meta-cognition strategies enhance learning and study habits (Ozsoyet al., 2009; Ruban& Reis, 2006). Therefore, it can be assumed that in the presence of learning strategies, meta-cognitive strategies show positive effect on study habits. Finding of present study reveals that learning strategies including both cognitive and resource management strategies significantly moderates the relationship between meta-cognitive awareness strategies and study habits. It indicates that students who are adopting meta-cognitive awareness strategies and are also successfully utilizing learning strategies in their study process can show better academic performance. Dembo (1994) suggested that we can teach various cognitive strategies to students but if they lack meta-cognitive strategies or they are not aware of when to use such meta-cognitive straggles, they are not considered as skillful learner. Consistent with the present finding, Javadi, Keyvanara, Yaghoobbi, Hassanzade, and Ebadi (2010) conducted study on medical students and found that

upper level students frequently used complex cognitive and meta-cognitive strategies as compared to lower level students. Moreover, relationship between meta-cognitive strategies and academic achievement was also significant.

Goal of present study is not only to understand strategies which can escalate study process or to improve study habits and guarantee academic achievement but also to identify gender difference in utilization of strategies and study habits. Brew (2002) conducted study on first-year university students of above-average ability and found gender differences in meta-cognitive strategies. With respect to learning strategies, numerous researches revealed that females used learning strategies more often than males (Lan & Oxford, 2003; Lee & Oh, 2001; Oxford & Ehrman, 1995). In line with the findings of prior researches, present study indicates that female students scored higher on study habits, resource management, cognitive strategies, meta-cognitive regulation strategies and meta-cognitive knowledge compared to male students.

Limitations and Future Directions

In the field of research, this study is considered as a meaningful step that is truly able to determine the effect of meta-cognitive awareness and learning strategies on study habits. But there are certain limitations which need to be addressed. As it is correlational study so it shows limited capacity of assessing cause and effect relationship between the variables under study therefore, question of causality is being raised which has to be further explored in future research. It is suggested to conduct future research on these variables through experimental design. Sample of present study is collected through convenient sampling technique which limits generalizability. In order to enhance generalizability, it is suggested to collect data through random sampling technique from different cities, private and government education institutions, and of different socioeconomic status with the same measures of meta-cognitive strategies, learning strategies and study habits. In order to improve validity of findings, it is recommended to collect data not only from same measures but also conduct interview of sample under study. Future research can also assess learning and meta-cognitive strategies of teachers and whether they utilize such strategies in teaching their students.

Conclusion

In a nut shell, current study proves that we can improve study habits of students by teaching them meta-cognitive strategies and learning strategies. Whenever qualified or talented students fail in college or drop out from graduate school, we are painfully reminded of the fact that investment in higher education is enormous. So there is a need to protect this investment and future of students by understanding factors involving in their success and failures. This study not only broadens knowledge in the area of meta-cognition and study habits but also highlights effective contribution of meta-cognitive strategies and learning strategies in study habits. It must be suggested in light of present study that teaching learning and study strategies to students and teachers found to be more effective for attaining educational objectives.

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