

## Investigating the Relationship between Students' Thinking Styles, Self-Efficacy for Learning, and Academic Performance at Qatar University

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### Abstract

Individual differences play an integral role in the academic achievement of university students. Past studies have focused on a number of factors that have impacted academic performance, such as intelligence, attitudes, self-esteem, and self-concept, just to name a few. In recent years, the roles of thinking styles and self-efficacy in relation to academic achievement have received much attention from researchers, educators and psychologists alike (e.g., Shkullak, 2013, Li, 2012, Sternberg, 1997; Honey, 1992). The purpose of this study was in two folds: First, to analyze if variations of thinking styles and self-efficacy for learning exist among students based on their academic year, colleges, nationality, and number of credit hours completed. Two, to gain new insight into related the relationship between students' thinking styles, self-efficacy for learning, and academic achievement at Qatar University.

### Thinking Styles and Academic achievement

A 'thinking style' is defined as an individual's preference for a specific thinking process (Zang et al, 2013). Thinking styles have two dimensions: Cognitive and affective. The cognitive dimension is related to the use of strategies for reasoning and problem solving acquired by experience. The affective dimension has to do with how the person's interests and attitudes affect them (Zhang et al, 2006). Kolb and others (1981) defined learning styles as "beliefs, preferences and behaviors that people utilize in order to learn in certain conditions" (p.58). Kolb (1976) affirmed that efficient learners use four learning modes. These include concrete experience, reflective observation, abstract conceptualization and active experimentation. He also categorized four learning styles: Converger, diverger, assimilator and accommodator. Kolb (1984) proposed that an individual develops a preference for a learning style in a certain method and that she or he may implement different styles in different conditions, but may prefer a learning style to another to solve a particular problem. The choice depends on the person's learning experience, the environment and abilities. Kolb suggested that learning improves when the content is presented in a way consistent with the person's preferred thinking style. Table (1) shows relationship between learning style and learning situations.

**Table 1: The relationship between learning style and learning situations**

Learning style	Situations in which students learn better
Assimilators	presented with sound logical theories
Convergers	provided with practical applications of concepts and theories
Accommodators	allowed to gain 'hands on' experience
Divergers	allowed to observe and gather a wide range of information

(Adapted from Kolb, 1984)

Several studies have revealed that thinking styles are linked to creativeness, problem solving, decision-making, and academic achievement (e.g., Zhang & Zhua, 2011). Other studies have shown that parents thinking styles play an important role in their children's thinking styles (Emamipoor et al, 2004).

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Zhang (2002) relied on Sternberg's theory of thinking styles and Perry's theory of cognitive development to investigate the relation between thinking style and cognitive development in Hong Kong University. Eighty-two students responded to the two inventories.

Results of the study corroborated the relationship between the thinking style and cognitive development. In other words, students using higher thinking levels level had a tendency to use a wider range of thinking styles than students who were at a lower cognitive level.

Bernardo and his colleagues (2002) tried to apply Sternberg's (1988, 1997) theory of mental self-government applies to a non-Western culture. 429 Filipino university students responded to the inventory. The results of study showed a relation between thinking styles and grade point average, which supports the proposed link between thinking styles and academic achievement. Being aware of the students' thinking styles, teachers could help them to know their learning habits, and help them to apply better learning strategies. Moreover, teachers can create a better and more attractive learning environment by being familiar with the methods, resources, and conditions in which students learn better and using these efficiently and effectively.

### ***Self-efficacy and Academic Achievement***

Albert Bandura defined self-efficacy as “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments”(Bandura, 1997, p. 193). Bandura (1998) assumed that the initiation of a task is determined by the level of self-efficacy, the quantity of effort that will be exhausted and the level of persistence to complete the task when an individual faces obstacles and aversive experiences. Various studies have shown that there is a positive and significant correlation between self-efficacy and academic performance (Bandura; 1997; Jones, 2010; Lodewyk, 2005; Lewix, 2011). These studies have revealed that the higher the sense of self-efficacy of a student, the better his or her academic achievement is regardless of sex, nationality or demographic status. In the same vein, Schunk (2003) also provided additional support for the impact of self-efficacy on student educational achievement. He stated that “a student’s self-efficacy beliefs influence such achievements behaviors as choice of tasks, effort, persistence, and achievement” (p. 165). A decade later, Shkullak (2013) found a significant relationship between the students’ self-efficacy and academic performance in a study of 280 Albanian university students. Findings also revealed no significant differences in self-efficacy between male and female participants.

In a study that investigated the influence of learning styles and self-efficacy on the academic performance of Malaysian candidates enrolled in a Master’s of Business Administration (MBA) program, Rashid (2004) revealed that the 122 participants with different learning styles did not differ in their academic performance. Findings also indicated that self-efficacy had a strong positive effect on the academic achievement. In addition, the interaction between learning styles and self-efficacy had a strong positive effect on the academic achievement of respondents. Similarly, Li (2012) assessed the relationship between self-efficacy, effort and academic achievement in sample of 153 students from the department of Applied Social Studies in the City University of Hong Kong. Findings revealed that attitude and self-efficacy were respectively related to each other; attitude was related to academic achievement; and academic self-efficacy correlated with academic achievement.

### ***Methodology***

#### **Participants**

A total of 289 college students from different majors participated in the study. 75.8% of the participants were Qataris and 24.2% non-Qataris. For convenience purposes and due to the fact that Qatar University is not a co-educational institution, the authors primarily focused on female participants as their enrollment percentage supersedes that of males by a 4:1 ratio. The mean GPA for the participants was 3.05; credit hours: 44% of the participants had completed more than 90 hours, and 26% 60-90 hours, the rest had 30-60 credit hours. 52% of the participants were from the College of Arts and Science; 18% College of Islamic Studies; 15% College of Education; the rest respectively represent College of Business and Economics 7%, College of Engineering 5%, and College of Law 3%. According to their enrollment year most of the participants enrolled in 2006 (39%), in 2005 (26%), and in 2007(15%).

#### **Instruments**

Thinking Styles Inventory—Revised II (TSI-R2) developed by Sternberg et al. (2007), consists of 65 statements. This inventory assesses the 13 thinking styles in Sternberg’s theory.

To respond to each statement, the participants were asked to rate themselves on a seven-point scale about their preferred ways of solving problems, carrying out tasks and making decisions.

It was translated to Arabic, back-translated to English, and revised by other instructors in psychological science department; the inventory was piloted to check for language accuracy. The authors obtained the following indices of reliability (Cronbach's Alpha: .933) and test retest ( $r = .511$ ), which are highly consistent with previous studies. Studies using both the English and Chinese versions of TSI-R2 indicated that all scales have satisfactory internal reliabilities with Cronbach's alphas between .63 and .86 (Zhua, Zhang, 2011; Zhang, 2004; Zhang, 2002; Grigorenko & Sternberg, 1997). Cronbach's alphas 0.57-0.78 (see table b appendix 1) which is consistent with this study scale. The factor analysis made on the data obtained from the TSI-R2 reveals that each item in all 13 scales had factor loadings above .30 (see table appendix 1).

Self-Efficacy for Learning Form (SELF-A). The SELF-A was developed by Barry Zimmerman and Anastasia Kitsantas in 2007. It consists of 19 items. The SELF deals with students' use of various self-regulation processes during academic learning. It was designed to measure each participant's perceived self-efficacy regarding reading, note taking, test-taking, writing, and studying. The students responded to each item using a scale that ranged from 0 to 100 points in 10-unit increments. Written descriptions were provided beside the following points on the scale: 0 (*definitely cannot do it*), 30 (*probably cannot do it*), 50 (*maybe*), 70 (*probably can*), and 100 (*definitely can do it*). Higher scores on this scale reflect more positive self-efficacy for learning beliefs. After translation to Arabic and back-translation to English; other faculty members in the department of psychological sciences revised and piloted the instrument to check for language accuracy. Psychometric analyses revealed that students' scores on the SELF were highly reliable, based on indices of Cronbach's Alpha .850, test retest ( $r = .556$ ), and criterion validity with self-stem scale ( $r = .404$ ).

### Procedures

All participants completed a short demographics questionnaire in which they noted their, academic year, college/department, nationality (Qatari or non Qatari), their credit hours, and GPA. Both the TSI-R2 and SELF-A were administered during regular classes in the beginning of the fall 2011 semester. Before collecting data, reliability and validity of the scales were examined; after collecting data, descriptive analysis and analyses of variance (ANOVA) were conducted to understand the effects of independent variables.

### Descriptive Statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
2001	2	.7	.7	.7
2002	4	1.4	1.4	2.1
2003	2	.7	.7	2.8
2004	16	5.5	5.5	8.3
2005	75	26.0	26.0	34.3
2006	113	39.1	39.1	73.4
2007	44	15.2	15.2	88.6
2008	26	9.0	9.0	97.6
2009	7	2.4	2.4	100.0
Total	289	100.0	100.0	

Table 3. Colleges

	Frequency	Percent	Valid Percent	Cumulative Percent
0	3	1.0	1.0	1.0
Education	45	15.6	15.6	16.6
Arts and Sciences	150	51.9	51.9	68.5
Islamic Studies	53	18.3	18.3	86.9
Engineering	14	4.8	4.8	91.7
Management and Economics	21	7.3	7.3	99.0
Law	3	1.0	1.0	100.0
Total	289	100.0	100.0	

**Table 4. Nationality**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Qatari	219	75.8	75.8	75.8
	Non Qatari	70	24.2	24.2	100.0
	Total	289	100.0	100.0	

**Table 5. Credit hours**

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 30 hours	37	12.8	12.8	12.8
Of 30-60 hours	45	15.6	15.6	28.4
Of 60-90 hours	77	26.6	26.6	55.0
More than 90 hours	129	44.6	44.6	99.7
6	1	.3	.3	100.0
Total	289	100.0	100.0	

**Table 6. TSI-R2**

		N	Minimum	Maximum	Mean	Std. Deviation	Variance
Thinking Styles		289	.00	442.00	320.3668	47.46633	2253.053
Inventory							
Valid N (listwise)		289					

**Table 7. SELF-A**

		N	Minimum	Maximum	Mean	Std. Deviation	Variance
Self-Efficacy for Learning		289	24.00	90.00	63.6851	12.82093	164.376
Valid N (listwise)		289					

**Table 8. GPA**

		N	Minimum	Maximum	Mean	Std. Deviation	Variance
GPA_G		289	1.50	4.00	3.0526	.84461	.713
Valid N (listwise)		289					

### **Research Hypotheses**

The following research **hypotheses** were formulated to guide the study:

1. There is a significant correlation between student thinking style and self-efficacy for learning.
2. There is a significant correlation between student academic performance and thinking style.
3. There is a significant correlation between student academic performance and self-efficacy for learning.
4. There is a significant difference between student thinking style and their academic year.
5. There is a significant difference between student thinking style and their college.
6. There is a significant difference between student thinking style and their nationality.
7. There is a significant difference between student thinking style and their credit hours.
8. There is a significant difference between student self-efficacy for learning and their academic year.
9. There is a significant difference between student self-efficacy for learning and their college.
10. There is a significant difference between student self-efficacy for learning and their nationality.

### **Results and Discussion**

Table 9 indicates that a significant correlation was found between students' thinking style and self-efficacy for learning  $r = 0.3140$ . There was also a significant correlation ( $r = 0.353$  at the 0.05 level) between students' academic performance as noted by their GPAs and thinking style (see table 10). Table 11 shows a significant correlation ( $r = 0.362$  at the 0.05 level) between students' academic performance as noted by their GPAs and self-efficacy for learning.

**Table 9. SELF-A and TSI-R2**

		Self-Efficacy for Learning	Thinking Styles Inventory
Self-Efficacy for Learning	Pearson Correlation	1	.314**
	Sig. (2-tailed)		.000
	N	289	289
Thinking Styles Inventory	Pearson Correlation	.314**	1
	Sig. (2-tailed)	.000	
	N	289	289

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 10. Academic Performance and TSII-R2**

		GPA	Thinking style
GPA	Pearson Correlation	1	.353*
	Sig. (2-tailed)		.030
	N	289	289
Thinking style	Pearson Correlation	.353*	1
	Sig. (2-tailed)	.030	
	N	289	289

\*. Correlation is significant at the 0.05 level (2-tailed).

**Table 11. Academic Performance and SELF-A**

		GPA	Self-Efficacy for Learning
GPA	Pearson Correlation	1	.362*
	Sig. (2-tailed)		.026
	N	289	289
Self-Efficacy for Learning	Pearson Correlation	.362*	1
	Sig. (2-tailed)	.026	
	N	289	289

\*. Correlation is significant at the 0.05 level (2-tailed).

Results from Tables 11 and 12 revealed significant difference between students' thinking style ( $F = 2.778, p < .05$ ), self-efficacy for learning ( $F = 3.035, p < .05$ ) and college.

There were no significant effects of academic year ( $F = 0.595, p > .05$ ), nationality ( $F = 0.418, p > .05$ ), and credit hours ( $F = 0.291, p > .05$ ) on students' thinking style. Similarly, no significant differences were noted between students' academic year ( $F = 1.689, p > .05$ ), nationality ( $F = 2.418, p > .05$ ) and their self-efficacy for learning.

**Table 11. ANOVA-TSI-R2**

Thinking Styles Inventory

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	36208.904	6	6034.817	2.778	.012
Within Groups	612670.217	282	2172.589		
Total	648879.121	288			

**Table 12. ANOVA-SELF-A**

Self-Efficacy for Learning

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2871.919	6	478.653	3.035	.007
Within Groups	44468.427	282	157.689		
Total	47340.346	288			

This study revealed that students' academic performance at Qatar University is related both to self-efficacy for learning and thinking style, which is consistent with findings from other studies. Academic self-efficacy, for instance, was found to be a significant predictor of academic performance (Elias & Loomis, 2004). Pintrich and Schunk (2002) asserted that learners who possess high self-efficacy are much more likely to be motivated in terms of effort, persistence and behavior than others who believe they are less capable and do not anticipate to do well. Moreover, the first type of learners will also be more cognitively engaged in learning and thinking than those who have reservations about their abilities to succeed (Pintrich, 1999). In the same vein, Greene et al. (2004) have shown that self-efficacy is positively correlated with measures of deep cognitive strategy use.

Since the present study has also shown significant differences between students' thinking styles, self-efficacy for learning, and their colleges, it may be worthwhile for the university's curriculum team to empirically investigate the curriculum content and extant pedagogical practices at each college in the context of students' thinking styles and perceived self-efficacy beliefs. These latter are considered so essential to academics that Bandura (1997) claimed that "perceived self-efficacy is a better predictor of intellectual performance than skills alone" (p. 216). It might also be a good idea for our student support and counseling services at the university to develop workshops aimed at equipping low-risk students with the necessary tools to boost their self-efficacy. To our knowledge, no single university or high school in Qatar has ever empirically examined students' thinking styles and self-efficacy in the context of their academic performance. Therefore, results from this study may help motivate other researchers in the region to investigate this topic further at their own educational institutions.

### ***Limitations***

The strengths of this investigation need to be evaluated in the context of its limitations. One limitation of the data analyses of this study is related to the nature of hypothesis testing. Since many statistical procedures were run in this investigation, and considering the fact that hypothesis testing all evolves around probabilities (Leedy & Ormrod, 2001), there is the chance that the researchers could have made a type I or type II error. Moreover, since the thinking style inventory and self-efficacy for learning questionnaire are self-report instruments, they are not immune from the response bias, which could have occurred because of faking good, lack of self-knowledge, or ambiguity of questions posed (Hammond, 2000). There was also the likelihood that participants might have interpreted the questions at different levels of understanding, which is one of the inherent shortcomings of self-report measures. Finally, because participants from this research were representative of the female university population at Qatar University, results cannot be generalized to all Qatar university students or to other geographical areas; therefore, generalizability is confined.

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**Appendix (1)**

Factor analysis item load (table a)

.580	a61	.565	a51	.564	a41	.579	a31	.413	a21	.537	a11	.384	a1
.323	a62	.388	a52	.634	a42	.538	a32	.332	a22	.415	a12	.334	a2
.368	a63	.574	a53	.441	a43	.508	a33	.537	a23	.441	a13	.459	a3
.551	a64	.451	a54	.480	a44	.442	a34	.523	a24	.483	a14	.503	a4
.564	a65	.590	a55	.465	a45	.426	a35	.555	a25	.351	a15	.440	a5
		.480	a56	.553	a46	.469	a36	.477	a26	.398	a16	.462	a6
		.524	a57	.461	a47	.667	a37	.472	a27	.358	a17	.381	a7
		.590	a58	.363	a48	.383	a38	.388	a28	.420	a18	.322	a8
		.461	a59	.581	a49	.378	a39	.513	a29	.539	a19	.540	a9
		.512	a60	.317	a50	.497	a40	.561	a30	.624	a20	.408	a10

Thinking style item dimension (table b)

thinking style type	Cronbach's Alpha	
legislative=(q5+q10+q14+q32+q49)/5	.675	
executive =(q8+q11+q12+q31+q39)/5	.643	
judicial =(q20+q23+Q42+q51+q57)/5	.767	
global=(q7+q18+q38+q48+q61)/5 .	.570	
local=(q1+q6+q24+q44+q62)/5 .	.654	
liberal =(q45+q53+q58+q64+q65)/5 .	.783	
conservative =(q13+q22+q26+q28+q36)/5 .	.637	
hierarchical =(q4+q19+q33+q25+q56)/5 .	.707	
monarchic =(q2+q43+q50+q54+q60)/5 .	.584	
oligarchic=(q27+q29+q30+q52+q59)/5	.750	
anarchic =(q16+q21+q35+q40+q47)/5 .	.642	
internal =(q9+q15+q37+q55+q63)/5 .	.721	
external =(q3+q17+q34+q41+q46)/5 .	.780	