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A CORRELATIONAL ANALYSIS OF EFL UNIVERSITY STUDENTS' CRITICAL THINKING AND SELF-EFFICACY

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Abstract

This article, first, examined the role of EFL university students' critical thinking (CT) in their self-efficacy beliefs. Second, the role of gender as a moderating factor in the relationship between students' CT and self-efficacy beliefs was investigated. Third, the difference between females and males regarding their CT and efficacy beliefs was studied. To attain the goals of the research, 86 EFL students sat through "Watson-Glaser Critical Thinking Appraisal" (Form A) and "Learners' Sense of Efficacy Survey". The findings of the study indicated that there is a significant relationship between EFL learners' CT and their self-efficacy beliefs and among the constructs of CT, *Interpretation* had the highest relationship with efficacy beliefs. The results also revealed that gender does not moderate the relationship between CT and self-efficacy. Furthermore, it was found that there is no significant difference between males and females regarding their levels of CT and self-efficacy beliefs.

Keywords: age, critical thinking, gender, self-efficacy, EFL learners.

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1. Introduction

Self-efficacy beliefs refer to the beliefs individuals hold about their ability to manage and carry out the courses of action required to deal with future circumstances. In essence, self-efficacy is the assurance that individuals have in their own capabilities (Pajares, 2000).

People's belief in their efficacy is a key factor in self-development, successful adjustment and change. Self-efficacy beliefs function via their influence on cognitive, motivational, affective and decisional processes, and cause individuals to think positively and hopefully or negatively and cynically, in self-enhancing or self-debilitating manners. Such beliefs have an effect on people's aims and aspirations and also on their level of motivation, determination and perseverance while encountering obstacles and hardships. They also form individuals' outcome expectations – whether they anticipate their endeavors to generate desirable results or undesirable ones. Furthermore, efficacy beliefs determine how environmental chances and barriers are perceived. In the face of obstacles, people with low efficacy are simply convinced of the vainness of attempt and quickly stop trying; on the contrary, those with high efficacy believe that difficulties are surmountable via self-development and perseverant endeavor. Facing impediments, they show resistance and are resilient to hardship (Bandura, 2005).

Regarding the role of self-efficacy beliefs in academic achievements, the same also goes for students in various academic and educational contexts. A substantial body of literature supports the relationship between students' self-efficacy beliefs for academic tasks and objectives and their academic performance on such diverse academic behaviors as, mathematics-specific self-efficacy (Pajares & Miller, 1995), computer training (Gist, Schwoerer & Rosen, 1989), exam performance (Vrugt, Langereis & Hoogstraten, 1997; Yeperen, 2006), essay writing (Pajares & Johnson, 1996), and language learning (Wong, 2005).

What has emerged from these studies is in line with Pajares's (2000) contentions that students with high levels of self-efficacy beliefs move toward difficult tasks as obstacles to be surmounted rather than as menaces to be shunned. They have greater intrinsic motivation, select challenging purposes and keep strong commitment to them, and while facing a failure, they increase and continue their endeavors. Additionally, after setbacks, they restore their confidence faster and ascribe them to acquirable issues such as inadequate attempt or insufficient knowledge and skills. For efficacious students, failure is a healthy stimulus causing them to work harder. In opposition, students with low self-efficacy view things as tougher than they really are. This belief, in turn, fosters stress and hopelessness and brings inability in how best to solve a problem. Such students usually attribute their failure to factors that are inborn, permanent, and not acquirable such as low ability. For them, failure reminds them of their incapability. Low efficacious students typically predict low grades for themselves even before they participate in an examination (Pajares, 2000).

Based on the prominent role that students' self-efficacy plays in their academic achievements and success, it seems necessary to seek for the factors that may have a relationship with or/and can influence students' efficacy beliefs. Critical thinking (CT) seems to be among the ones that may have correlation with students' efficacy beliefs. A substantial theoretical and empirical base now exists in the literature to demonstrate the association of CT with students' academic success (among them are Lee & Loughran, 2000; cited in Phan 2010; Kealey, Holland & Watson, 2005). The contention is that higher-order thinking skills enhance higher order learning skills leading to higher levels of language proficiency (Renner, 1996). One would conclude just by reasoning that if one possesses the ability to reflect leading to achievement and the development of expertise, one should believe that s/he could more effectively learn and perform expected behaviors to

desired levels. In other words, his/her beliefs about efficacy in that specific domain will be boosted.

In a similar vein, more recently, an emerging body of research indicated the association of each of these constructs with individuals' success in L2 contexts (e.g. Birjandi & Bagherkazemi 2010; Davidson & Dunham, 1997; Ghanizadeh & Moafian, in press; Wong 2005). Although studies on self-efficacy and CT have examined these two constructs separately and contributed in parallel to effective learning and teaching literature, they have rarely been investigated jointly in the domain of foreign language learning and teaching, except for the one conducted by Moafian and Ghanizadeh (2010) on Iranian EFL teachers. Definitely, the dearth of research in this area provides a sufficient reason to undertake further investigation at examining the relationship between self-efficacy expectations and CT skill among Iranian EFL learners.

2. Literature Review

2.1 Self-efficacy theory

In *Social Foundation of Thought and Action*, published in 1986, Bandura proposed a social cognitive theory that emphasizes the role of beliefs assisting individuals to control their thoughts, feelings and actions. These beliefs compose a self-system, and the interaction between this system and external sources of influence constitutes human performance and behavior (Pajares, 2002a). In other words, self-efficacy influences one's performance and the surroundings with which one interacts, and is influenced by one's actions and situations in the environment (Schunk & Meece, 2005).

Since individuals function both collectively and individually, self-efficacy is a personal as well as a social construct. A sense of collective efficacy has been defined as a group's joint beliefs in its ability to achieve aims and execute desired tasks (Pajares, 2002b). Many of life obstacles and challenges are group difficulties that require collective endeavor to make significant change. Therefore, It is people's sense of

collective efficacy in solving the encountered problems and improving their lives via joined attempt that constitutes the strength of group, organizations, and even nations. People's beliefs in their collective efficacy affect what they select to do as a group, how much endeavor they make to perform it, their persistence and tolerance when collective efforts are unsuccessful at producing quick outcomes, and their probability of success (Bandura, 1994).

2.2 Sources for developing self-efficacy

Self-efficacy is enhanced via four primary sources: actual performance, vicarious experiences, forms of persuasion and physiological reactions. Students' performances are the most reliable guides for judging self-efficacy; the impacts of the other sources are more variable. Generally, successes increase and failures decrease self-efficacy (Schunk & Meece, 2005).

The second source of enhancing efficacy beliefs is to acquire self-efficacy information regarding others' performances via social comparisons. In this perspective, the best basis for comparison is similar others. When students observe that their similar peers are able to learn a task, a belief may also be created in them in that they can also learn it. Of course, it should be noted that vicarious experience has a weaker impact than mastery experience because it can be negated by succeeding performance setbacks (Schunk & Meece, 2005).

Persuasive information such as other's verbal encouragement can enhance self-efficacy; nevertheless, if following performances make different outcomes, its influences may be temporary. Physiological indicators (e.g. heart rate, feelings of anxiety) are another source of indicating efficacy beliefs. These signs can reveal that one lacks skills; on the contrary, learners may feel more self-efficacious when they experience fewer emotional symptoms (Schunk & Meece, 2005).

The impacts of obtained information from these sources on self-efficacy do not occur automatically; this information is cognitively

weighted and assessed. individuals normally utilize different elements such as discernments of their capabilities, former successes, perceived task difficulty, the extent of spent effort, the extent of received help, perceived resemblance to models, the reliability of reinforcer, and the kind and strength of emotional signs (Schunk, 1995; cited in Schunk & Meece, 2005).

2.3 Self-efficacy and gender

Previous research investigating the relationship between gender and self-efficacy has almost inclusively indicated that individuals' self-efficacy does not change with gender differences. Pajares (2002c) contended that males and females do not differ significantly in their sense of self-efficacy beliefs. In a similar vein, Tschannen-Moran and Woolfolk Hoy's (2002) study revealed that gender differences do not significantly predict individual's self-efficacy beliefs. In contrast, a study by Imants and De Brabander (1996) yielded a weak, but significant positive correlation between gender and teacher self-efficacy.

2.4 Definitions of critical thinking

There are a multitude of definitions for what constitutes CT. Dewey (1933), the father of modern critical thinking, described CT from a philosophical perspective whereby education was meant to provide conditions to cultivate habits or training of the mind. Ivie (2001) defined CT in terms of reflective practice which enables one to “establish clear and logical connections between beginning premises, relevant facts, and warranted conclusions” (Ivie 2001, p. 10). CT was defined by the American Philosophical Association Project as purposeful and self-regulatory judgment which results in interpretation, analysis, evaluation and inference and is founded on the conceptual criteria upon which a judgment is based (Facione & Facione, 1996). Watson and Glaser (2002) associated CT with the following abilities:

Inferencing drawn from factual statements; recognizing assumptions in a series of statements; interpreting whether conclusions are warranted or not; determining if conclusions follow from information in given statements, and evaluating arguments as being strong and relevant or weak and irrelevant (pp. 21–23).

As it can be seen, despite the long history of CT tradition, there is no single and agreed-upon definition for what constitutes CT. However, almost all the scholars of CT conceptualized it as a higher-order thinking ability associated with the reflectivity and evaluation.

2.5 Critical thinking and gender

Traditional beliefs and stereotypes have conclusively suggested that men are superior at analytical thinking, so are better critical thinkers. Scientifically speaking, however, the issue of gender differences in CT has remained an area of controversy among researchers. Some studies reject gender differences on CT measures and some are in favor of the influential role of gender differences in CT skill. For instance, Kuhn's (1992) findings revealed that argumentative thinking does not differ with sex. Semeric (2010) also reported that the relationships between gender and subdimensions of CT were almost zero. The studies of Myers and Dyer (2006) and Moafian and Ghanizadeh (2010) also confirm this finding. In these two studies, it was found that there were no differences between the CT skills of male and female students (Myers & Dyer, 2006) and teachers (Moafian & Ghanizadeh, 2010). On the other hand, Simon and Ward's (1974) results indicated that men performed better than women on the Watson-Glaser test, and this was due to their better performance in the subscales of Inference and Evaluation of Arguments. King, Wood and Mines (1990) also found that gender differences lead to different results on CT measure.

2.6 Areas of critical thinking influence

Despite the controversy over a unified definition for CT, there is a general consensus that CT can be influential in almost every discipline and occupation, due to its association with abilities such as problem-solving and decision-making. In educational setting, it is widely accepted that learning to think is one of the most important goals of formal schooling. Dewey (1933) stated that the central purpose of education is learning to think. As part of that education, learners need to develop and learn to apply CT skills to their academic studies effectively (Kealey, Holland & Watson, 2005), to the complex problems that they will face in their professions (Yeh, 2004), and to the critical choices they will be forced to make as a result of the information explosion and other rapid technological changes (Oliver & Utermohlen, 1995). In L2 context, it seems that attention to CT deserves the additional considerations due to the position of problem-solving, attitudes, self-regulation, and meta-cognitive abilities in L2 classes.

Likewise, more recently, ways in which CT might be interpreted and taught have become highly debated questions for L2 learning scholars and practitioners (Thompson, 2002). A shift has occurred from viewing learning primarily as rote training to conceptualizing learning as a constantly evolving process of discovering, questioning, and reformulating hypotheses (Pennycook, 1994).

CT skills have also recently gained attention in research related to student attitudes and achievement and a diverse body of educational research reported the importance of promoting higher-order thinking skills and the positive influence of CT on learners' achievement in EFL contexts (e.g. Davidson & Dunham, 1997; MacBride & Bonnette, 1995). Reconsidering the sources of efficacy expectations, one may plausibly infer that this sense of language learning success, as a manifestation of mastery experience, may tend to promote self-efficacy for L2 learning. So, it is reasonable to assume that there may be a relationship between L2 learners' CT and efficacy beliefs. The dearth of investigation into the

possible relations between these two constructs does echo a clear need to undertake a research exploring such a relationship. In summary, an attempt is made in the present study to investigate the relationship between EFL learners' CT and their self-efficacy beliefs. To this end, the following research questions were posed and investigated in this study:

1) What is the relationship between EFL learners' CT and their self-efficacy beliefs?

2) As a moderator factor, does gender play any significant role in the relationship between EFL learners' CT and their sense of efficacy beliefs?

3) Is there any significant difference between females and males regarding their CT?

4) Is there any significant difference between females and males regarding their sense of self-efficacy beliefs?

3. Method

3.1 Participants

86 Iranian EFL learners participated in this study. There were 52 females and 23 males; 11 participants did not specify their gender. Their age varied from 20 to 31 years old ($M = 21.98$, $SD = 2.13$); 15 participants did not specify their age. They were sophomores, seniors and juniors who were studying English Literature, Teaching and Translation at Mazandaran, Binaloud and Ferdowsi universities and Azad universities of Mashad, Tehran and Quchan.

3.2 Instruments

3.2.1 Watson-Glaser's critical thinking appraisal (Form A)

To evaluate teachers' critical thinking ability, the "Watson-Glaser Critical Thinking Appraisal" (CTA) (Form A) was employed. This test comprises 80 items and consists of 5 subtests as follows (Hajjarian, 2008, pp. 87-88):

Test 1. Inference: Discriminating among degrees of truth or falsity of inference drawn from given data.

Test 2. Recognizing Unstated Assumptions: Recognizing unstated assumptions or presuppositions in given statements or assertions.

Test 3. Deduction: Determining whether certain conclusions necessarily follow from information in given statement or premises.

Test 4. Interpretation: Weighing evidence and deciding if generalizations or conclusions based on the given data are warranted.

Test 5. Evaluation of Arguments: Distinguishing between arguments that are strong and relevant and those that are weak or relevant to a particular question at issue.

The reliability of the Watson-Glaser test has been determined in three ways: the estimates of the test's internal consistency, the stability of the test scores over time and the correlation between the scores on the alternate forms. Internal consistency was measured using split-half reliability coefficients using the Spearman-Brown formula. Testing stability over time, by administering the test to the same group with an interval difference, indicates an acceptable level of stability (0.73). Regarding validity, the Watson-Glaser test enjoys all areas of face, content, criterion and construction validity (Hajjarian, 2008). In the present study, the Persian version of the Watson-Glaser test was applied. According to Mohammadyari (2002), this test and its subscales do have reliability and validity in Iranian culture. To analyze the reliability of the questionnaire, she utilized split-half reliability estimate. With the adapted version in Iran, the reliability was found to be 0.98 and the results of the factor analysis provided some support for the inventory hypothesized structure (Mohammadyari, 2002). In this study, the total reliability of the questionnaire was calculated via Cronbach' alpha which was found to be 0.61.

3.2.2 Learners' self- efficacy survey

To assess the EFL learners' level of self-efficacy, "Learners' Self-Efficacy Survey" was employed. This questionnaire was designed and standardized by Gahungu (2009). As Gahungu stated the questionnaire operationalizes the self-efficacy construct via scores obtained on 40 items ranging from never to always. To estimate the reliability of the "Self-Efficacy Survey", the Kuder-Richardson 21 reliability was computed and the result was .97. In this study, the total reliability of the questionnaire was calculated via Cronbach' alpha which was found to be 0.95.

3.3 Data collection

The study was conducted in several universities (Mazandaran University, Ferdowsi University, Binaloud University, Azad University of Tehran, Azad University of Mashhad and Azad University of Quchan) in Babolsar, Mashhad, Tehran and Quchan, between May 2009 and January 2010. The participants were asked to take the learners' Sense of Efficacy Survey and the Watson-Glaser Critical Thinking Appraisal (Form A). They took the questionnaires home, filled them in and during the following weeks submitted them to the researchers or their friends who were in charge of data collection. To receive the reliable data, the goal of filling out the questionnaires was explained to the subjects and they were assured that endeavour would be made to observe the confidentiality and anonymity considerations. Besides, the participants' questionnaires were coded numerically and they were asked not to write a name on their questionnaires

3.4 Data analysis

To ensure the normality of the distribution, descriptive statistics and Shapiro-Wilk test were employed. To determine the relationship between learners' CT and their self-efficacy, a one-way ANOVA was conducted to the data. To identify the precise location of the differences, a Scheffe's

test was utilized. To find out which constructs of CT might have more predictive power in predicting learners' self-efficacy, a multiple regression analysis was run. To determine the role of gender as a moderating factor in the association between CT and efficacy, a standard multiple regression was run. To examine whether there is any significant difference between females and males regarding their CT and sense of self-efficacy beliefs, a t-test was run.

4. Results

In order to analyze the relevant data in this experiment, the Statistical Package for Social Sciences (SPSS), version 17 was employed. The level of significance was set at 0.05. Table 1 summarizes the descriptive statistics of the two instruments - Efficacy and CT Questionnaires - used in this study.

Table 1: Descriptive statistics of self-efficacy and CT

	N	Minimum	Maximum	Mean	Std. Deviation
CT	86	25.00	61.00	45.61	6.71
Efficacy	86	50.00	158.00	103.34	25.16

After computing the CT scores, based on Watson-Glaser's (2002) classification, the subjects were divided into three groups; the subjects who scored 35 and below comprised the low CT group, those scoring between 36 and 55 were placed in the mid CT group, and those who got between 56 and 80 formed the high group. Thus, three groups were formed as displayed in Table 2.

Table 2. Group membership based on CT scores

	N	Score
High CT	4	56-80
Mid CT	76	36-55
Low CT	6	0-35

To ensure the normality of the distribution of the three groups on the data gathered from the second instrument of the study, i.e. "the learners' Self- Efficacy Survey", a Shapiro-Wilk test was run. The underlying reason of utilizing Shapiro-Wilk test was the small sample size in both high and low groups. The results revealed that there is a normal distribution of scores in each group ($p>0.05$) (See Table 3).

Table 3. Test of normality

	CT	Shapiro-Wilk		
		Statistic	df	Sig.
Efficacy	High	.861	4	.264
	Mid	.978	76	.204
	Low	.908	6	.424

To examine the homogeneity of variances of the three groups, the Levene's test of homogeneity of variance was applied. As displayed in Table 4, the F value of 1.70 at 2 and 83 degrees of freedom was lower than the critical value of 3.11. Thus, the underlying assumption of one-way ANOVA is met, i.e. there is no marked difference between the variance of the three groups. In other words, the result of the Levene's test of homogeneity of variance revealed that the three groups enjoyed homogenous variances.

Table 4. Levene's test of homogeneity of variances

Levene Statistic	df1	df2	Sig.
1.70	2	83	.18

Then, a one-way ANOVA was applied to compare the mean scores of the three groups on the Learners' Self-Efficacy Survey. The F-observed value is 5.3. This amount of F-value at 2 and 83 degrees of freedom was higher than the critical value of F, i.e. 3.11 (See Table 5).

Table 5. One-way ANOVA self-efficacy by CT

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6097.41	2	3048.70	5.30	.007
Within Groups	47740.12	83	575.18		
Total	53837.53	85			

Therefore, it can be concluded that there is a significant difference between the mean scores of the three groups of learners on the Self-Efficacy Survey. The effect size, calculated via eta squared, was found to be 0.11. This indicates the degree of association between the dependent (self-efficacy) and independent (CT) variable. The descriptive statistics for the three groups on the efficacy questionnaire are displayed in Table 6.

Table 6. Descriptive statistics of self-efficacy survey

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
High	4	115.50	11.09	5.54	97.85	133.14	100.00	124.00
Mid	76	105.05	24.55	2.81	99.44	110.66	52.00	158.00
Low	6	73.66	20.81	8.49	51.82	95.50	50.00	102.00
Total	86	103.34	25.16	2.71	97.95	108.74	50.00	158.00

ANOVA analysis revealed that there is a difference somewhere among the means, but the precise location of differences is not clear. To locate the exact place of differences, a post hoc comparison of the means was performed. In so doing, a Scheffe's test was utilized. The results of the post-hoc Scheffe's test indicated that, at the level of 0.05, there was no significant difference between the efficacy mean scores of the two groups of mid and high, but the difference between the efficacy mean

score of the low group and those of the two other groups was significant; the efficacy mean score of the low group was lower than those of the mid and high groups (See Table 7).

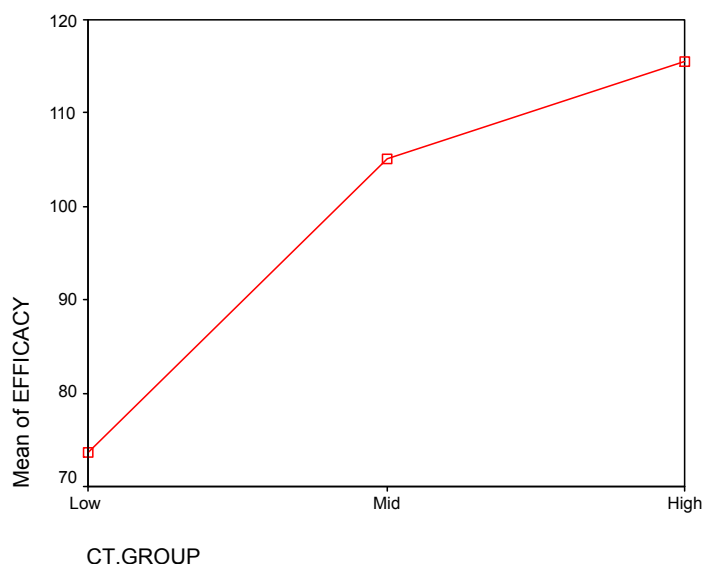
Table 7: Scheffe's test for the comparison of efficacy means by CT

(I) CT	(J) CT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Low	Mid	-31.38596*	10.17015	.011	-56.7360	-6.0359
	High	-41.83333*	15.48093	.030	-80.4210	-3.2457
Mid	Low	31.38596*	10.17015	.011	6.0359	56.7360
	High	-10.44737	12.30300	.698	-41.1137	20.2190
High	Low	41.83333*	15.48093	.030	3.2457	80.4210
	Mid	10.44737	12.30300	.698	-20.2190	41.1137

*. The mean difference is significant at the 0.05 level.

The figure below shows the relationship between the mean scores of efficacy of the three groups of learners and the CT code of the same groups. As the following figure indicates, in the low group, the same as mid and high groups, the increase in CT level leads to the increase in efficacy level, but this relationship is not significant at the level of $p=0.05$.

Mean Plots



To investigate which constructs of CT might have more predictive power in predicting learners' self-efficacy and how other constructs contribute to this model, a regression analysis was employed. Table 8 summarizes the descriptive statistics of the five constructs of CT.

Table 8: Descriptive statistics of the five constructs of CT

	N	Minimum	Maximum	Mean	Std. Deviation
Inference	86	1.00	11.00	5.7674	2.02731
Recognizing Unstated Assumptions	86	2.00	14.00	10.2093	2.28095
Deduction	86	3.00	15.00	9.5116	2.18414
Interpretation	86	4.00	16.00	10.3256	2.23576
Evaluation of Arguments	86	5.00	15.00	9.8023	2.15199

The following Table is the ANOVA table of regression. The

magnitude of F-value and the amount of the respective p-value ($p < 0.05$) indicate the considered model is significant (See Table 9).

Table 9: The results of correlation between the components of CT and self-efficacy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8085.755	5	1617.151	2.828	.021 ^a
	Residual	45751.780	80	571.897		
	Total	53837.535	85			

a. Predictors: (Constant), Evaluation of Arguments, Inference, Recognizing Unstated Assumptions, Deduction, Interpretation

b. Dependent Variable: efficacy

As Table 10 displays, among the five subscales of CT, only one subscale – Interpretation – was found to be a positive predictor of the dependent variable (self-efficacy).

Table 10: Results of regression analysis for learners' CT and self-efficacy

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47.865	18.205		2.629	.010
	Inference	-.419	1.420	-.034	-.295	.769
	Recognizing Unstated Assumptions	1.132	1.273	.103	.889	.377
	Deduction	.432	1.283	.037	.337	.737
	Interpretation	3.678	1.369	.327	2.686	.009
	Evaluation of Arguments	.435	1.270	.037	.342	.733

Dependent Variable: Efficacy

Table 11 illustrates the model summary statistics. The results

revealed that the model containing all constructs of CT can predict 15 percent of the learners' self-efficacy beliefs. In other words, it indicates that about 15% of the variation in learners' self-efficacy can be explained by taking their CT into account (See Table 11).

Table 11: R square table for CT as the predictor of learners' self-efficacy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.38	.15	.09	23.91

Predictors: (Constant), Evaluation of Arguments, Inference, Recognizing Unstated Assumptions, Deduction, Interpretation

To determine the role of gender as a moderator in the relationship between CT and efficacy among learners, a standard multiple regression analysis was run. In so doing, three models were considered. In the first model CT, in the second model CT and gender and in the third model CT, gender and the interaction between these two factors were regarded as independent variables. Table 12 is the ANOVA table of regression. The extent of F-values and the quantities of the associated p-values ($p < 0.05$) suggest the considered models are significant.

Table 12: ANOVA table of regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6445.655	1	6445.655	11.107	.001 ^a
	Residual	41202.236	71	580.313		
	Total	47647.890	72			
2	Regression	8532.146	2	4266.073	7.634	.001 ^b
	Residual	39115.745	70	558.796		
	Total	47647.890	72			
3	Regression	8537.784	3	2845.928	5.021	.003 ^c
	Residual	39110.107	69	566.813		
	Total	47647.890	72			

a. Predictors: (Constant), CT

- b. Predictors: (Constant), CT, Gender
- c. Predictors: (Constant), CT, Gender, Gender x CT
- d. Dependent Variable: Efficacy

Table 13 illustrates that, among different variables involved in the models, only the p-values of CT are less than 0.05; therefore, the existence of this factor is necessary in the models. The magnitudes of VIF demonstrate that there is no collinearity in the models.

Table 13: Results of regression analysis for gender as a moderator in the relationship between CT and efficacy

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	36.911	19.993		1.846	.069		
	CT	1.444	.433	.368	3.333	.001	1.000	1.000
2	(Constant)	34.742	19.651		1.768	.081		
	CT	1.571	.430	.400	3.653	.000	.976	1.024
	Gender	-11.647	6.027	-.212	-1.932	.057	.976	1.024
3	(Constant)	35.102	20.118		1.745	.085		
	CT	1.567	.435	.399	3.605	.001	.969	1.032
	Gender	-11.651	6.071	-.212	-1.919	.059	.976	1.024
	Gender x CT	-.012	.125	-.011	-.100	.921	.992	1.008

a. Dependent Variable: Efficacy

Table 14 demonstrates information related to the three regression models fitted to the data. Comparing the three magnitudes of R square change indicates that increasing the number of variables leads to decreasing the amount of R square change. Therefore, the first model is the best model. Moreover, in terms of other items in the table including F change, the changes are good indicators of the superiority of the first model. The yielded results confirm the findings of ANOVA presented in

Table 13. Hence, gender does not moderate the association between CT and efficacy.

Table 14: R square table for gender and CT as the predictors of learners' self-efficacy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.368 ^a	.135	.123	24.08969	.135	11.107	1	71	.001
2	.423 ^b	.179	.156	23.63887	.044	3.734	1	70	.057
3	.423 ^c	.179	.143	23.80784	.000	.010	1	69	.921

a. Predictors: (Constant), CT

b. Predictors: (Constant), CT, Gender

c. Predictors: (Constant), CT, Gender, Gender x CT

To discover the role of gender in the magnitude of each variable – CT and Efficacy, independent t-tests were run. As Table 15 displays, gender does not play any significant role neither in the learners' CT ($t=1.53$, $p>0.05$) nor in their Efficacy ($t=-1.30$, $p>0.05$) (See Table 15).

Table 15: Results of independent t-test for determining the role of gender in CT and efficacy

	t	df	Females' averages	Males' averages	Sig. (2-tailed)
CT	1.53	73	44.61	47.17	.13
Efficacy	-1.30	73	105.44	97.21	.19

5. Discussion

The primary purpose of this study was to examine the possible relationship between EFL learners' CT and their sense of efficacy beliefs. The researchers of the present study set out to investigate such a relationship based on logical reasoning followed from the theoretical and empirical studies in the literature that indicated the positive influence of

CT on learners' academic achievement and attitudes. This led the researchers to presume that this feeling of success may enhance learners' beliefs in their capabilities, i.e. their self-efficacy beliefs. Besides, reexamining the proposed definitions of CT would reveal that a trace of self-efficacy beliefs is discernible in almost most recent definitions of CT. Giancarlo and Facione (2001) characterized CT as a purposeful and self-regulatory judgment about one's beliefs. They noted that a person engaged in CT uses a set of cognitive skills to form that judgment and to monitor and improve the quality of that judgment. Huitt (1998) believed that a sound model of CT must include some component of beliefs. Accordingly, the following is his proposed definition of critical thinking: "critical thinking is the disciplined mental activity of evaluating arguments or propositions and making judgments that can guide the development of beliefs and taking action" (p.5).

The results of the present study verified the researchers' contention. The findings indicated that there is a positive relationship between EFL learners' CT and self-efficacy; however, this association was substantiated to be significant only in the low CT group. This is in line with theoretical contentions which indicate there is an interactive association between CT and other factors such as achievement and self-efficacy beliefs (Bandura, 1997, 2001; cited in Phan, 2010). Phan's (2010) theoretical framework of self-regulation and reflective thinking suggests that the subprocesses involved in these two constructs (including self-efficacy and CT) coexist and interact in a dynamic fashion. In addition to theoretical confirmation, the results of the present study are consistent with empirical studies, though they are quite sparse. Leung and Kember (2003) found positive relations between CT and motivational variables such as goal orientations, self-efficacy beliefs and effort. It has also been reported that the development of CT will contribute to the ambiguity tolerance, responsibility taking, confidence and self-efficacy enhancement (Kuiper, 2002). In L2 context, situating critical thinking within the framework of self-regulation, including self-

efficacy as a subcomponent of self-regulation, Ghanizadeh (in press) indicated that critical thinking ability has a facilitative role in enhancing EFL teachers' self-regulation over time. The results of the present study, nevertheless, contradict Moafian and Ghanizadeh's (2010) study. In this study, the researchers examined the relationship between EFL teachers' self-efficacy and their CT skill in Language Institutes. To this end, 94 EFL teachers sat through the "Watson-Glaser Critical Thinking Appraisal" and the "Teachers' Sense of Efficacy Scale". The results of data analysis revealed that there was no significant relationship between teachers' self-efficacy and CT. The researchers attributed this to several factors inherent in the study such as lack of variation among CT scores which could yield a very low estimate of correlation.

Based on the results of the present study, it appears that the promotion of EFL learners' CT will have a positive influence on their sense of self-efficacy beliefs. That is to say, the more the EFL learner develops CT skills, the more efficacious s/he will be in his/her learning. The significance of such an association in EFL contexts resides in the fact that both of these constructs have been found to be particularly associated with higher academic achievement and are critical in the process of L2 learning and teaching (Ghanizadeh & Moafian, in press; Pennycook, 1994; Thompson, 2002).

As indicated earlier, among the components of CT, *interpretation* - weighing evidence and deciding if generalizations or conclusions based on the given data are warranted - was found to have the highest correlation with self-efficacy. This finding can be attributed to the context of the present study. Studying at higher education is associated with divergence and reflectivity which entail assessing and reflecting on the variety of information and subjects they may receive in the course of their university education. This in turn necessitates deciding upon the most warranted materials essential for academic achievement and success. When this is fulfilled, their mastery experience is also expected to be enhanced, resulting in higher sense of self-efficacy beliefs.

Additionally, there are some contentions in efficacy literature confirming the positive relationship between interpretation and efficacy beliefs. For example, Johnson (2008) stated that “an individual’s interpretation of his past successes raises his self-efficacy while his interpretation of his past failures lowers his self-efficacy” (p. 9). Pajares (1996) argued that the way individuals interpret the outcomes of their performance accomplishments notifies and changes their environments and their self-beliefs, which in turn adjust their succeeding acts. Bandura (1997, cited in Brown, 1999) pointed out that beliefs are often achieved via observation and interpretation. In another article, he (1982) noted that it is only after cognitive appraisal which information needed for judging capabilities becomes instructive. It appears that after conducting appraisal, it is the type of interpretation that leads to the enhancement or decline of efficacy beliefs. Last but not the least, Feltz (1982) studying self-efficacy beliefs in sport skills, proposed that “if athlete’s interpretation of physiological arousal as fear can be manipulated and changed to interpretation of it as ‘psych’ or ‘preparedness’, self-efficacy may improve with the change in cognitions following from psychological reactions” (p.10; cited in Lan & Gill, 1984).

The second research question aimed at investigating the roles of gender as a moderating factor in the relationship between students’ self-efficacy and CT. The findings illustrated the intended moderator had not a significant impact on the relationship between CT and learner self-efficacy. This suggests that regardless of gender, a learner’s CT ability is related to his/her level of self-efficacy. Hence, it can be argued that critical thinking is a significant predictor of self-efficacy even after controlling for the effect of gender.

The researcher’s third question investigated the relationship between gender and CT. The results indicated that there was no difference between males and females in using their CT abilities, and females got the same scores as males. This is in accordance with the findings of Kuhn (1992), Semeric (2010), Myers and Dyer (2006) and Moafian and

Ghanizadeh (2010). This can be explained in the view of the fact that the modern life has taught both females and males to have almost identical level of CT and to get through everyday difficulties by applying their CT skills regardless of their sex. This is more evident in academic settings, especially university context, where developing higher-order thinking abilities such as CT is an indispensable part of the agenda of higher education for all students irrespective of their gender, major, nationality, race, and so on.

Similar to the previous question, the fourth research question investigated whether there is any significant difference between females and males regarding their sense of self-efficacy beliefs. Consistent with theoretical and empirical research by Tschannen-Moran and Woolfolk Hoy (2002) as well as Pajares (2002c), the present study demonstrated that gender is not significantly related to self efficacy. In other words, females and males do not differ greatly in their L2 learning efficacy. This finding is not unexpected considering the fact that self-efficacy is under the influence of a wide array of factors such as prior successful performance, vicarious experience and social persuasion, all of which seem to be irrelevant to gender differences especially at higher-education level and within university contexts.

6. Conclusion

The results of the present study lead to this conclusion that EFL learners' CT plays a decisive role in their sense of self-efficacy beliefs. In other words, EFL learners who are equipped with CT feel more efficacious in learning a foreign language. This alternatively may lead to greater persistence and motivation on the part of the students, since efficacious learners have been found to possess greater intrinsic interest in activities and sustain their efforts in the face of failure (Pajares, 2002c). It has been also proposed that students' self-efficacy perceptions play a key role in determining how well individuals perform academically (Bandura, 1995). Hence, it can be plausibly argued that encouraging and instructing

learners to develop CT, with a particular focus on interpreting arguments and evidence, result in greater academic performance and motivation.

The results of the present study did not support this conclusion that the relationship between EFL learners' CT and self-efficacy is mediated by their age and gender. In other words, it appears that CT is a significant predictor of self-efficacy even after controlling for the effects of gender and age. Also, in the light of the results of this study it can be concluded that CT ability does not change with learners' age and gender. The conclusions derived from this study highlight the significance of designing and utilizing effective programs and strategies for developing CT skills for all students irrespective of their age and gender. The context of the present study may further underline this requirement on the ground that this is the highest level of thinking that presumably constitutes the ultimate objective of the agenda of higher education (Jarvis, 2005). According to Facione and Facione (1997), every program targeted at developing CT at higher education must encompass these components: *truth-seeking, open-mindedness, analyticity, systematicity, self-confidence, inquisitiveness, and maturity* (cited in Jarvis, 2005). Curriculum designers and material developers are, thus, recommended to develop programs and materials incorporating these constituents. Teachers, in particular EFL teachers, are recommended to develop and integrate the abilities associated with CT in the classroom context via procedures such as assigning controversial topics for discussion and witting, encouraging divergence and reflectivity, reinforcing inference-making, and making them familiar with procedures that promote CT such as portfolio, concept mapping and journal writing.

The present study is limited in two ways. First, the participants were selected according to available sampling. The study should be replicated using procedures that allow a higher degree of randomization and ultimately more generalizability. Furthermore, in this research, students' CT and self-efficacy were assessed via questionnaires. Using qualitative approaches such as interviews, case studies, and observations to

investigate these constructs would allow researchers to understand not only if relationship exists between the variables in question, but also the processes by which these constructs develop in the classroom context.

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