

Preparatory School Learners' Level of Critical Thinking Proficiency and Its Correlation with Their Academic Achievement in Ethiopia: The Missing Ingredient

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Abstract: The present study investigated the level of preparatory school learners' critical thinking proficiency and its relation with their academic achievement. To the researchers' best knowledge, there is hardly any documented study exploring the relationship between these constructs among preparatory learners. To attain the purpose of the study, 108 grade 12 preparatory school learners from two sections (53 social science and 55 natural science majors: 56 male and 52 female students) were selected using a simple random sampling technique from Woldia Preparatory School. Data was collected through a critical thinking proficiency test adapted from "Cornell Class-Reasoning Test, Form X" (CCTT) and learners' previous semester cumulative average. The data was analyzed statistically, employing Descriptive Statistics, Independent-Samples T Test, Pearson product-moment correlation, and linear regression. The results from the descriptive analysis showed that the critical thinking proficiency of preparatory school learners was weak, namely, most students lack critical thinking proficiency at this level. Moreover, the level of critical thinking didn't vary significantly across majors and gender according to the independent-samples t test analysis. However, results from Pearson product-moment correlation indicated a fairly strong and positive correlation between critical thinking proficiency and academic achievement. The linear regression results also revealed that critical thinking proficiency act as the best predictor of academic achievement. The discussion and implications of the research are further presented with reference to the finding.

Keywords: Critical Thinking, Academic Achievement, Predictor, Preparatory School Learners, Proficiency

1. Introduction

Students may know a lot of facts, but if they are unable or unwilling to assess claims and make judgments on the basis of well-supported reasons and evidence rather than emotion or anecdote, can we call them truly educated? [1]

Education is a key of life. It is the formal and informal processes of teaching and learning used to develop a person's knowledge, skills, attitudes, understanding, etc., which intend to help learners to cop up with the fast growing technology and scientific discoveries. These knowledge and skills also comprise enormous ideas like creativity, innovation, problem solving, communication, collaboration, teamwork, and critical thinking [2]. In particular, critical thinking is considered as the most essential and decisive factor for any

success in the 21st century [3]. Hence, the accomplishment of the proficiency to think critically is considered as an indispensable life skill.

From the perception of academic, according to Ammons and Friday-Stroud [4], learners who acquired advanced critical thinking abilities can have higher attainment of course knowledge, higher grades and grade point averages, and active/reflective learning. Furthermore, Shakirova, as cited in Snyder and Snyder [5], noted that critical thinking skills are essential because they serve as a vehicle for educating the mind and empowering students to handle social, scientific, and practical problems effectively. Critical thinking is the component skill of higher-order thinking that prop up higher order learning skills. Thus, enhancing learners' critical thinking capacity on their own learning process can

possibly assist them to improve in their learning. In other words, "Improvements in the one are paralleled by improvements in the other" [6]. In addition to aforementioned scholars, Zahedi and Razi [7] argue that critical thinking is the most effective factor for successful accomplishments in educational life.

For those reasons, especially, in the past two or three ten years, scholars and educators have emphasized the value of integrating critical thinking within and across academic areas (Iakovos, 2011 [8]; Lai, 2011 [9]; Tung and Chang, 2009 [10]; Van Tassel-Baska, Bracken, Feng and Brown, 2009 [11]). Moreover, scholars (e. g. Kulekçi and Kumlu, 2015 [12]; Marin and Halpern, 2011 [13]; John Dewey as cited in Reed, 1998 [14]) argued that the primary rationale of formal education is to enhance learners' critical thinking skills because the capacity to think critically is requisite in the modern world where the tempo for the creation of new knowledge is escalating in alarming rate.

Nonetheless, Sternberg as cited in Karbalaei (2012: 122) [15], argues that the current educational systems often emphasize mere memorization of facts instead of critical thinking: "rote memorization requires recital and repetition while critical thinking requires skillful analysis, evaluation, and interpretation." Similarly, Kulekçi and Kumlu (2015) [12] argue that in most countries the educational system does not assist learners to elevate or practice their critical thinking skills since it usually prepares learners to be passive thinkers. In other words, the existing educational trend which focuses on test scores constraints teachers' capacity to deal with critical thinking in the classroom (Snyder and Snyder, 2008) [5]. Giving more emphasis on teaching to enhance the test result of learners distracts the teaching-learning process from learners' self-construction of knowledge and places the emphasis on memorization of facts presented by teachers. If the focus is on learning, students should be given the autonomy and accountability to explore content, analyze resources, and apply information (Reed, 1998) [14].

Furthermore, studies from the governmental and non-governmental bodies give supportive evidences that students from every regions of the country do not acquire the literacy, knowledge or skills required to their level (e. g., EGRA, 2002) [16]. In the same way, other research findings disclosed that the quality of Education, at every level, across Ethiopia is in a state of crisis (Amlaku, 2010 [17]; Dessie, n. d. [18]; MoE, 2002 [19]). To be more specific, according to Amlaku (2010) [17], Ethiopian schools are currently producing large number of inefficiently trained young graduates for the real-world demands of work, higher education, and everyday living.

Linked to this argument, Dessie (n. d.: 28) [18] found out in his study that "The students' disposition towards critical reading tasks and intellectual standards of critical thinking was found very limited." Furthermore, he learned from the intervention that students gave little attention to carry out critical reading tasks. Students have been trying to read for a mere comprehension. As a result, Dessie concluded that learners had little or no insights concerning the logical principles of critical thinking. In addition to Dessie, in the

summary report of the Institute of International Education briefing paper (2012) [20], various groups of participants of the conference on 'Enhancing the Quality of English Language Education in Ethiopia' reflected on the production of exam-oriented students who do not internalize their learning, and the declining tendency in critical thinking.

On the contrary to the above mentioned research findings, Ethiopian government strongly claim that it is working on quality of Education. For instance, as it is stated in Wondimu, Skalicka and Kostalova (2010: 6) [21], "Access to and quality of education have been a long-term priority of the Ethiopian government and great improvement has been achieved in this regard." They further argue that "the focus on quality of education is further proved by the introduction of General Education Quality Improvement Program (GEQIP) by the Ethiopian government." (p. 6). Thus, these controversies were the focal points for this study: finding the possible missing link between the strategy and the outcome.

Learning the significance of critical thinking for educational success from the literature, the present researcher assumed that the absence or lack of critical thinking proficiency might be the possible missing ingredient that results for the deterioration of the quality of education throughout the country (Ethiopia). Therefore, this study was conducted to investigate learners' level of critical thinking proficiency, the correlation between learners' critical thinking proficiency and their academic achievement, and the predictive effect of critical thinking on learners' academic achievement. Therefore, the researcher formulated the following research questions.

2. Research Questions

This study was designed to answer the following research questions:

1. What is preparatory school learners' level of critical thinking proficiency?
2. Is there a statistically significant mean difference on critical thinking proficiency between social and natural science students?
3. Is there a statistically significant mean difference on critical thinking proficiency between female and male students?
4. Is there a correlation between learners' critical thinking proficiency and academic achievement?
5. Does critical thinking predict learners' academic achievement?

3. Design of the Study

This research followed a quantitative research approach and an explanatory, correlation, research design. In order to gather data related to the research questions, adapted critical thinking test was administered, and for the purpose of conducting a correlation analysis between critical thinking proficiency and academic achievement, learners' first semester average of the general academic achievement scores were used.

3.1. Participants

The data was gathered from 108 Woldia Preparatory School students. The researcher used a simple random sampling technique to select two sections of students: one from natural science (n = 55) and one from the social science (n = 53) field. As a result, 12th C and 12th H were chosen from the natural and social science fields, respectively. Furthermore, in accordance with gender, 56 (51.85%) of the participants were male while 52 (48.15%) of them were female.

3.2. Instruments

A critical thinking test was administered to measure the learners' critical thinking proficiency. The test was adapted from the Cornell Class-Reasoning Test, Form X (CCTT) and it consisted of 50 items: every item was followed by three options (i. e., Yes, No and May be). The internal consistency of these instruments was found to be .81. Besides, learners' scores of general academic achievement were taken from their first semester cumulative average of the 2009 E. C. (2016/2017 G. C.) academic year.

3.3. Data Analysis

The data was analyzed quantitatively, and the Statistical

Package for the Social Sciences (SPSS), Version 20.0 was used for analysis. Both the results from the critical thinking test and learners' academic achievement were used for data analysis purpose. Descriptive Statistics, Independent-Samples T Test, Pearson product-moment correlation and linear regression were employed to analyze the data. Descriptive Statistics was used to identify the level of learners' critical thinking while the Independent-Samples T Test is employed to find out the statistical difference of critical thinking score between natural and social science students as well as between genders. In addition to these, correlation was calculated using the Pearson Product Moment Coefficient to describe the degree of association between learners' critical thinking proficiency and their academic achievement. Finally, linear regression was used to identify the prediction of academic achievement by critical thinking proficiency.

4. Results

4.1. Preparatory School Learners' Level of Critical Thinking Proficiency

In order to identify preparatory school learners' level of critical thinking proficiency, a descriptive statistics were computed. The results are presented in Table 1.

Table 1. Descriptive Statistics.

Section		N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Natural Science	CCT	55	30.00	8.00	38.00	19.0909	5.94192	35.306
Social Science	CCT	53	24.00	6.00	30.00	20.0566	5.43993	29.593
Male	CCT	56	30.00	8.00	38.00	19.8929	6.14870	37.806
Female	CCT	52	24.00	6.00	30.00	19.2115	5.19931	27.033
Total	CCT	108	32.00	6.00	38.00	19.5648	5.69517	32.435

A descriptive statistics was computed in order to identify learners' level of critical thinking proficiency and academic achievement. Thus, the above table displayed that the mean score and standard deviation of students' critical thinking proficiency are 19.56 and 5.70, with the maximum and minimum score of 38 and 6, respectively, while the average mean and standard deviation of natural science students were 19.09 and 5.94, and social science students were 20.06 and 5.44, respectively. In addition to these, the mean and standard deviation of male learners were found to be 19.89 and 6.15 while the mean and standard deviation of female

learners were 19.21 and 5.20, respectively.

4.2. The Comparison of Critical Thinking Proficiency Between Students of Different Fields and Genders

In order to compare the difference between the mean scores of students in accordance with their field of study (natural and social science) and gender (male and female), the data were subjected to an independent samples t test which yielded the following.

Table 2. Independent Samples T-Test.

						t-test for Equality of Means						
						T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
											Lower	Upper
CT	Field	Natural	55	19.09	5.94	-.880	106	.381	-.96569	1.09738	-3.14136	1.20997
		Social	53	20.06	5.44							
	Gender	Male	56	19.89	6.16	.619	106	.537	.68132	1.09996	-1.49946	2.86210
		Female	52	19.21	5.21							

An independent samples t-test is conducted in order to assess mean differences of critical thinking test scores

between learners' based on their field of study (natural and social) and gender (male and female). As it is stated in the table, significant difference was not found between natural science ($M = 19.09$, $SD = 5.94$) and Social science ($M = 20.06$, $SD = 5.44$) students on critical thinking scores, $t(1, 106) = -.882$, $p = .381$. Similarly, the mean difference between male students ($M = 19.89$, $SD = 6.16$) and female students ($M = 19.21$, $SD = 5.21$) was not also significant, $t(1, 106) = .619$, $p = .537$.

4.3. The Correlation of Learners' Critical Thinking Proficiency with Their Academic Achievement, Field of Study and Gender

In order to assess the relationship between the critical thinking proficiency and academic achievement of preparatory school students, data were analyzed using a Pearson product-moment correlation coefficient. The results are presented in Table 3.

Table 3. Pearson Correlation Coefficient.

		CCT	Average	Section	Sex
CCT	Pearson Correlation	1	.704**	.085	-.049
	Sig. (2-tailed)		.000	.381	.616
	N	108	108	108	108
Average	Pearson Correlation	.704**	1	.103	.001
	Sig. (2-tailed)	.000		.287	.993
	N	108	108	108	108

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

As it is illustrated in the above table, a strong positive significant correlation was found between learners' critical thinking proficiency and academic achievement, $r(108) = .704$, $p < .001$. On the contrary, learners critical thinking was not significantly related with learners' field of study and gender, $r(108) = .085$, $p = .381$ and $r(108) = -.049$, $p = .616$, respectively.

4.4. Critical Thinking Proficiency as a Predictor of Academic Achievement

In order to identify the prediction of academic achievement by critical thinking proficiency, a linear regression analysis was done, and it yielded the following results.

Table 4. Linear Regression Analysis Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.	Beta
1	.704 ^a	.495	.490	5.44027	103.889	.000 ^b	.704

a. Dependent Variable: Academic Achievement.

b. Predictors: (Constant), Critical Thinking Proficiency.

Table 4 illustrates the model summary statistics of the linear regression analysis. The results indicated that learners' critical thinking proficiency is a significant predictor of the dependent variable (academic achievement), $F(1, 106) = 103.89$, $p < .001$. The R value is .704 which indicates a strong correlation coefficient between critical thinking proficiency and academic achievement. Its square value is 0.495. It indicates that about 50% of the variation in learners' academic achievement can be explained by taking their critical thinking proficiency into account.

5. Discussions and Implications

Results of this study are discussed, here after, in accordance with the literature and research findings.

The first research question sought answers to the level of learners' critical thinking proficiency. Thus, the findings of the descriptive analyses were discussed as follow.

As shown in Table 1, descriptive statistics related to the level of learners' critical thinking proficiency showed the mean of natural science learners ($M = 19.09$, $SD = 5.94$) and social science learners ($M = 20.06$, $SD = 5.44$). By comparing the means of these two disciplines, it was found that students from the social science field achieved higher

than students from natural science. Furthermore, a slight difference was also observed between the mean of male ($M = 19.89$, $SD = 6.16$) and female learners ($M = 19.21$, $SD = 5.21$). However, these findings did not show any significance on the mean differences noticed between the fields of studies and genders.

The total critical thinking test scores were ranged from 6 to 38, and the mean score was 19.56 with a standard deviation of 5.70. Hence, the result indicated that the overall critical thinking proficiency of grade 12 preparatory school students' was weak. The findings of this study matches with the findings of Dessie (n. d.) [18].

This result can be further explained in view of that the existed educational system may lack the standard or framework to develop learners' critical thinking proficiency along with academic contents. To support this, as Reed (1998: 2-3) [14] notes, "Studies have shown that most schools are neither challenging students to think critically about academic subjects nor helping them develop the reasoning abilities needed to deal successfully with the complexities of modern life."

The findings of the present study imply that more work needs to be done towards uplifting the level of critical thinking proficiency among preparatory school students. The

implication can be also understood in view of other researchers (such as Karbalaei 2012 [15]; Yen and Halili, 2015 [22]) that critical thinking is an enormously desirable proficiency for each and every person in any educational situation; therefore, in order to train learners to think critically, every educational system should be transformed and take the issue of critical thinking seriously.

The second and third research questions asked whether there is a significant mean difference on critical thinking proficiency between students of different majors and genders. To answer these questions the findings of independent samples t-tests were used.

Independent Samples T-Tests were conducted to compare the difference on the level of critical thinking proficiency between different field of studies and genders: natural and social science as well as female and male. Eventually, a statistically significant difference was not found between the mean of natural and social science learners, $t(1, 106) = -.882$, $p = .381$ as $p > .05$. This indicated that taking different type of courses perhaps did not affect learners' level of critical thinking.

Additionally, the researcher computed independent-samples t-test to compare the level of critical thinking proficiency between male and female learners. Then, the researcher found out that the mean difference between male and female learners' critical thinking proficiency score was not statistically significant, $t(1, 106) = .619$, $p = .537$. This finding suggests that noticeable gender differences are non-existent in critical thinking proficiency of grade 12 preparatory school learners. The result of this study is also congruent with the findings of Barjesteh and Vaseghi (2012) [23]; Nordin (2015) [24]. The findings from their study, similarly, indicated that there was no significant difference between males and females in using their critical thinking skills. Therefore, it can be inferred that, alike field of study, gender might not be also the main factor that influences learners' level of critical thinking proficiency.

The implication behind the findings of this study and others was that critical thinking works equally for all students without any distinction based on the differences on their field of study as well as genders. This can be explained further in view of the fact that the existing gender related programs being implemented throughout the country to provide equal access for women in every aspect might contribute its share for the result that females and males to have almost identical level of critical thinking.

The fourth research question of this study sought to answer the correlation between learners' critical thinking proficiency and academic achievement. To answer this question, the findings of a Pearson product moment correlation coefficient analysis were interpreted.

One of the problems of this study aimed at investigating the relationship between critical thinking proficiency and academic achievement of preparatory school learners. Thus, the Pearson Correlation Coefficient was conducted. The results of the data analysis revealed that a strong positive significant correlation was found between learners' critical

thinking proficiency and academic achievement at an alpha level of .01, $r(108) = .704$, $p < .001$. Moreover, this relationship ($r = .704$) was found to exceed Cohen's (1988) convention for a large effect size ($r = .50$). This finding is in accordance with the findings of Kamaei and Weisani (2013) [25] whose study identified a significant positive correlation between critical thinking and academic achievement and this is also confirmed by other researchers (such as Facione, 2011 [6]; Marin and Halpern, 2011 [13]; Sherafat, 2015 [26]).

Therefore, the implication behind the results of this study and others mentioned above was that when enough credit is not given to critical thinking in curricular subjects, in turn, it may lead learners' to the inability of obtaining excellence in academic competency which is a requirement to achieve well in their university entrance examination. To strengthen this, Housen (2001-2002) [27] states that critical thinking develops a mysterious affiliation to academic subjects. This further implies that critical thinking needs an academic content as a medium for its practice and improvement, because of the very fact that it cannot be improved in a vacuum.

However, unlike afore mentioned researchers, other researchers (i. e., Nordin, 2015 [24]; Zahedi and Razi, 2014 [7]) have come up with different findings. They found no significant correlation between critical thinking and academic achievement. This discrepancy might occur as a result of cultural, grade level and environmental variations between the research participants of this study and theirs. In addition, the variations or inconsistency of outcomes suggest the need to take this variable into account in future research.

The fifth research question of this study sought to answer whether critical thinking proficiency is a significant predictor of learners' academic achievement. To answer this question, the results from the Linear Regression analysis were used.

To analyze the data further, regression analysis was conducted. Table 4 illustrated a model summary statistics and the results indicated that learners' critical thinking proficiency was found to be a predictor of academic achievement. The R value was .704 which explains the correlation coefficient between critical thinking proficiency and academic achievement. This relationship ($r = .704$) was found to exceed Cohen's (1988) [28] convention for a large effect size ($r = .50$). Therefore, we can infer that critical thinking is a strong predictor for academic achievement. Its square value was .495, and it indicates that about 50% of the variation in learners' academic achievement can be explained by taking their critical thinking proficiency score into account. This finding is in line with the finding of Kamaei and Weisani (2013) [25]. They also discovered that critical thinking is a predictor of academic achievement. "Based on literature," according to Sherafat (2015: 145) [26], "critical thinking, because of its nature considers as a facilitator to enhance students' abilities to be generator of new knowledge."

These findings can be explained further in a way that advancing the level of learners' critical thinking proficiency heightens their intelligence of receiving, analyzing,

synthesizing information and applying it in an appropriate way. According to Housen (2001-2002: 101) [27], "Critical thinking transcends the subject matter in which it initially develops." Therefore, learners who have higher critical thinking proficiency can have higher academic excellence that enables them to handle the educational tasks and problems better than those who have lower levels of critical thinking.

In general, the present study has some useful implications for classroom instruction. Since critical thinking skills can be developed and taught (Housen, 2001-2002 [27]; Marin and Halpern, 2011 [13]), and based on the findings of the present study and those of the other studies mentioned above, it can be recommended that critical thinking should be recognized as a core academic skill, as it facilitates learners' accomplishments of various educational outcomes successfully. Therefore, critical thinking should be taught in line with curricular subjects so as to improve learners' academic achievement.

6. Conclusions

On the basis of the aforementioned findings, the researcher forwarded the following conclusions.

The critical thinking proficiency level of preparatory school students is weak. Though there are some variations on the mean of critical thinking proficiency between students from different field of studies and genders: natural and social science as well as female and male students, the differences are not statistically significant. Therefore, it is concluded that there is no substantial variation between natural and social science students, and female and male learners on their critical thinking proficiency. On the contrary to learners' low level of critical thinking proficiency, it has strong positive correlation with academic achievement, and it also strongly predicts learners' academic achievement. In general, lack of critical thinking proficiency as well as its strong linkage with academic achievement leads us to understand that critical thinking is the possible missing ingredient that caused for the existed problem of the education system.

Therefore, the researcher suggests that enough attention should be given to enhance learners' critical thinking proficiency, and attention is needed at the planning and implementation levels because persistent discrepancies in curriculum development and classroom practices will continue to make the effective teaching of critical thinking in the classroom extremely fussy or intangible.

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