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Influence of Gender and Optional Subjects on the Critically Thinking Ability of Higher Secondary School Students

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Abstract

Critical thinking has been called “the art of thinking about thinking” (Ruggiero, 2012) with the intent to improve one’s thinking. It is one among the many life skills enlisted by WHO. Citizens who can think critically are the need of the nation. The new era warrants persons who can think and evaluate the information correctly. It is the duty of education to inculcate the skill of critical thinking in the students, the future citizens. This study investigated the influence the effect of gender, and the optional subject selected by the higher secondary students on their critical thinking ability. Survey method was employed for the study. The sample consisted of 640 higher secondary students. A Critical Thinking Ability Test for Higher Secondary School Students, constructed and standardized by the investigators was used for the collection of data. Percentage analysis, t test and ANOVA were used as statistical measures for the study. The results revealed both gender and optional subjects of the students influenced the critical thinking ability of students.

Key words: critical thinking ability, gender, higher secondary school students, optional subjects.

Introduction

The critical thinking ability skill can be thought of as a common buzz word in the 21st century that is quintessential for equipping the modern day learners to lead a successful life. One of the best ways to solve problems is to look it from several standpoints before taking a final decision. It is reported in the history that Socrates and Buddha used to preach about the decisive role played by critical thinking ability to reason out an issue. The traditional system of education gave importance only to the accumulation of knowledge. The modern educational system is driven by information and technology and flexible intellectual skills are extensively demanded by the modern day economy. The ability to analyze information and integrate various sources of knowledge depends on one’s ability to think critically and rationally before arriving at a solution. The present day educational system concentrates upon developing life skills in the learners, thereby making them fully equipped for confronting their life ahead. Critical thinking can be thought of one such life skill and it can be defined as the ability to think critically, evaluate or judge the value of the knowledge,

266 | May 2019 Volume 9 Number 5

[Index in Cosmos](#)

[UGC Approved Journal](#)



solve problems, observe keenly etc. Burden and Byrd (1994) categories critical thinking as a higher order thinking that requires a set of cognitive skills. It is the ability to think clearly, rationally, to engage in reflective and independent thinking.

Review of Related Literature

King, Wood and Mines (1990) in their study on “Critical Thinking among College and Graduate Students” found that the students pursuing science scored higher than students belonging to other groups. Also male students performed better compared to female students in their critical thinking ability scores.

According to Burden and Byrd (1994), critical thinking skill is a higher-order thinking skill that requires active participation of a set of cognitive skills.

Studies reveals that the club activities, extensive reading (Eftekhary and Kalayeh, 2014), implementing technology in the teaching-learning process (Bob, 2009), higher studies and experience (Laura, Witsberger, Wesniller, Zullo and Hoffman,2008) has a great influence on the learners critical thinking ability.

Ernst and Monroe (2006) in their study “The effects of environment based education on students’ critical thinking skills and disposition toward critical thinking” found that environment-based education has a positive effect on the students’ critical thinking skills.

In yet another study, Gellin (2003) reported that undergraduate college students who participated in club activities scored higher critical thinking ability cores compared to those who didn’t participate in such activities.

Need of the study

Critical thinking ability is the ability where by students thinks independently and thus develops opinions of their own. They are quite essential to all aspects of learning. Rote learning and mere reproduction of it for the purpose of examination is not enough. Students should develop the ability to think critically in their academic as well as future life also. A child who can think critically will be a better reader, writer, test taker and learner- both inside ad outside the classroom (Eftekhary & Kalayeh, 2014). There are chances that students who lack the critical thinking skills can fail while confronting problems of life. A study on critical thinking ability is hence the need of the hour. Identification of such skills in students will enhance their learning and make them successful learners.

Statement of the Problem

The present study is entitled as “Influence of Gender and Optional Subjects on the Critically Thinking Ability of Higher Secondary School Students”



Objectives of the Study

- To find out the level of critical thinking ability of higher secondary students.
- To determine the influence of gender on the critical thinking ability of higher secondary students(Male/Female)
- To determine the influence of optional subjects (Science/Commerce/Humanities) on the critical thinking ability of higher secondary students

Hypotheses of the Study

To test the above stated objectives, the researcher formulated the following hypotheses:

1. Higher secondary school students differ in their level of critical thinking ability
2. There exists significant difference in the mean scores of critical thinking ability for the sub-samples based on Gender (Female/Male)
3. There exists significant difference in the mean scores of critical thinking ability for the sub-samples based on Optional Subject (Science/Commerce/Humanities)

Methods

Method Adopted

In the present study the investigator adopted normative survey method.

Sample Selected for the Study

The total sample for the present study consisted of 640 higher secondary school students from different schools of Palakkad district. While selecting the sample due representation was given to gender and optional subjects of the students.

Tool Used for the Study

The data required for the present study were collected using the Critical Thinking Ability Test for Higher Secondary School Students, constructed and standardized by the investigators. The tool was constructed using the following dimensions viz. Observation, Interpretation, Analysis, Inference, Evaluation, Problem solving and Logical reasoning.

Statistical Techniques Used

Percentage analysis, t-Test and ANOVA were used for the analysis of data

Data Analysis

Hypothesis 1

Higher secondary school students differ in their level of critical thinking ability



The different levels (high, average and low) groups of students categorized on the basis of their mean score of critical thinking ability is presented in Table 1.

Table 1

Variable	Group	Score	n	%
Critical Thinking Ability	High	≥ 40.39	128	20.00
	Average	≤ 25.47	404	63.13
	Low	25.47-40.39	108	16.87

Table 1 shows the level of critical thinking ability of higher secondary school students for the total sample. It is evident from the table that 20 percent of the total sample has high critical thinking ability, 63.13 percent has average critical thinking ability and 16.87 percent has high critical thinking ability. The graphical representation of the distribution of the total sample into different levels of critical thinking ability is given in Figure 1

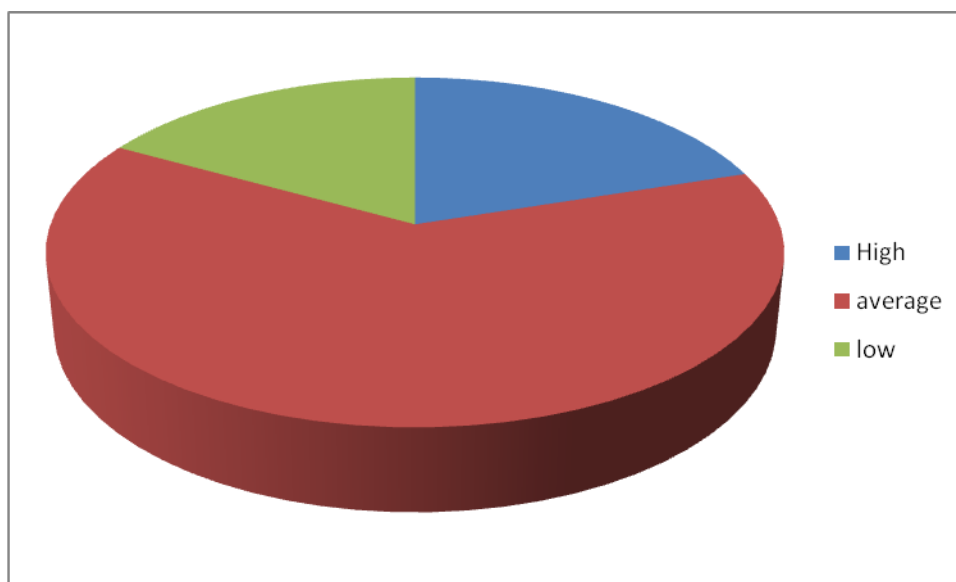


Figure 1. Graphical representation of the different levels of critical thinking ability of higher secondary school students

The percentage analysis reveals that higher secondary students falls in to three levels of critical thinking ability (high, average and low). It also depicts that most of the higher secondary school students have an average level of critical thinking ability (63.13). This difference may be attributed to the variance in the core critical thinking skills possessed by the students. Another reason can be due to the lack of training to think critically and arrive at upon a decision. Students in our education system are constrained within their



prescribed textbooks. Moreover they don't get much time to read beyond their syllabus. This is also the period where they spend much of time choosing their higher education. It would be interesting to note that making an extensive reading influences the critical thinking ability of students (Eftekhary & Kalayeh, 2014) and hence should be encouraged to read much beyond their textbooks.

Hypothesis 2

There exists significant difference in the mean scores of critical thinking ability for the sub-samples based on Gender (Female/Male)

The result of the statistical analysis of difference in the mean scores of critical thinking ability of female and male higher secondary school students is presented in the Table 2.

Table 2

Test of Significance of Difference in the Mean Scores of Critical Thinking Ability of Female and Male Higher Secondary School Students.

Variable	Gender	N	M	SD	CR	P
Critical thinking ability	Female	318	34.00	7.63	3.64**	p < .01
	Male	322	31.88	7.14		

Note. ** The difference is significant at .01 level of confidence.

Table 2 shows that the critical ratio for the test of significance of difference in the mean scores of critical thinking ability of female (M = 34.00, SD = 7.63) and male (M = 31.88, SD = 7.14) higher secondary school students is 3.64, which is found to be greater than the table value 2.58 at 0.01 level of confidence. This reveals that there exists significant difference in the mean scores of critical thinking ability of female and male students. Hence hypothesis 2 is accepted.

It can also be interpreted from the table that female students has high critical ability score compared to the male students. This result is in contrary with the result of the studies by King, Mines and Wood (1990) and Mohammadi, Headri and Niryi (2012) who found that male students have more critical ability score compared to female students. Another study by Eftekhary and Kalayeh (2014) has reported that gender has no influence on the critical thinking ability.



The difference in the mean scores of female and male students is graphically represented in

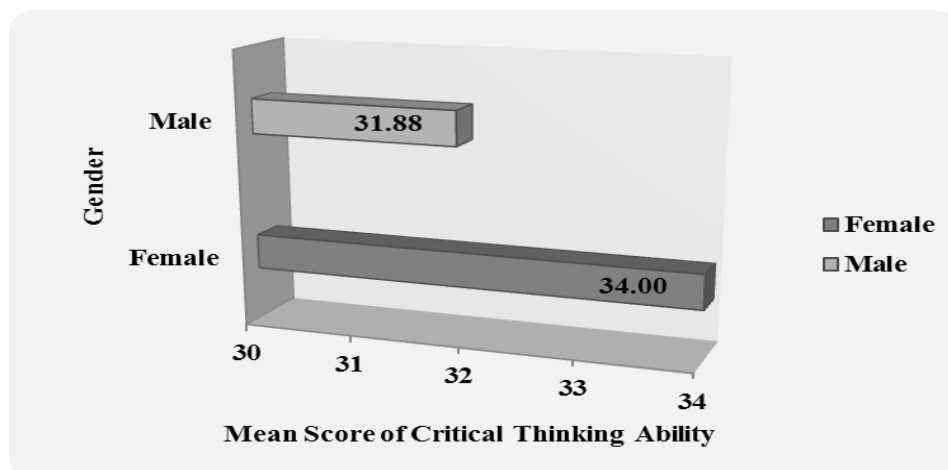


Figure 2

Figure 2. Difference in the mean scores of critical thinking ability of female and male higher secondary school students

Hypothesis 3

There exists significant difference in the mean scores of critical thinking ability for the sub-samples based on Optional Subject (Science/Commerce/Humanities)

The result of the test of significance of difference in the mean scores of critical thinking ability of students based on their optional subjects Commerce, Humanities and Science students is presented in the Table 3.

Test of Significance of Difference in the Mean Scores of Critical Thinking Ability of Science, Commerce and Humanities Higher Secondary School Students.

Table 3

Descriptive Statistics of Critical Thinking Ability of Commerce, Humanities and Science Students

Group	N	M	SD
Commerce	218	33.12	7.52
Humanities	214	30.07	7.36
Science	208	35.69	6.38



To test the significance of difference in the mean scores the investigators applied ANOVA. The result of the test of significance of difference in the mean scores of critical thinking ability of Commerce, Humanities and Science students is given in Table 4.

Table 4

Table Showing the Result of the Test of Significance of Difference in the Mean Score of Critical Thinking Ability of the Students of Commerce, Humanities and Science

Source of variation	SS	Df	MS	CR	p
Between groups	3339.49	2	1669.74	33.011**	p < .01
Within group	32220.01	637	50.58		
Total	35559.50	639			

Note. **The difference is significant at .01 level of significance

From Table 4 it can be noted that the obtained critical ratio is 33.011, which is much greater than the table value (Table R), 4.65 to be significant at .01 level. Thus it can be inferred that the difference in the mean scores of the critical thinking ability of commerce, humanities and science students is significant at .01 level of significance.

The result of ANOVA shows that the difference in the mean scores of the students of commerce, humanities and science group is significant. Hence the third hypothesis is accepted, which means that there exists significant difference in the mean scores of critical thinking ability scores based on their optional subject.

The investigator conducted Scheffe's post hoc test for further analysis. The result of post hoc analysis is given in Table 5.

Table 5

Table Showing the Result of Scheffe's Post hoc Test of Difference Among the Mean Score of Students of Commerce, Humanities and Science Group

Group (I)	Group (J)	Mean Difference (I-J)	p
Science	Commerce	2.57*	p < .05
Science	Humanities	5.62*	p < .05
Commerce	Humanities	3.04*	p < .05

Note . *The difference is significant at .05 level of confidence



From Table 5 it is evident that the difference in the mean score of critical thinking ability of students of Science and Commerce subject (2.57) is significant at .05 level of confidence.

It can be inferred that the difference in the mean scores of critical thinking ability of students of Science and Humanities (5.62) is significant at .05 level of confidence.

The mean difference in the scores of critical thinking ability of students of Commerce and Humanities subjects is 3.04 which is greater than the table value at .05 level of confidence.

Therefore it can be inferred that there exists significant difference in the mean score of critical thinking ability of the students of science and commerce, science and humanities and for the students of commerce and humanities.

It can also be seen from Table 3 that the mean score of critical thinking ability of science students is higher compared to higher secondary students of commerce and humanities. The abstract nature of science would have probably influenced the critical thinking ability of students who opted science as their optional subject.

Major Findings of the Study

- There exists different levels of critical thinking ability scores (high, average and low group) of higher secondary school students.
- Out of the total sample, 20 percent has high critical thinking ability, 63.13 percent has average critical thinking ability and 16.87 percent has high critical thinking ability.
- There is influence of gender on the critical thinking ability of higher secondary school students.
- Female students possess high critical thinking ability when compared to the male students.
- There is influence of optional subject (commerce/ humanities / science) on the critical thinking ability of higher secondary school students.
- Science students possessed more critical thinking ability than students who opted commerce and humanities.

Educational Implication

The finding of the study reveals that gender and optional subject (commerce/ humanities / science) have differential effect on the critical thinking ability of higher secondary school students. Critical thinking is highly essential when it matters to the higher education of students. It is the duty of parents as well as teachers, governments and other administrators to restructure the field of education in order to develop the ability of the learners to think critically. The study shows that aided school students have more critical thinking ability than government school students. The academic environment of government schools should be improved so that the learners can get wide exposure to the world of knowledge.



Teachers should take initiative in conducting programmes like debates and organization of different clubs in the school where the students will get an opportunity to exercise on their ability to think critically on issues around them.

Not only science, critical thinking skills should be embedded in each and every school subject. The present study shows that science students have high critical thinking ability than the commerce and humanities students. Steps should be taken to avoid this condition. Extensive reading, club activities should be promoted so as to enhance the critical thinking ability of learners.

Conclusion

The finding of the study reveals that gender and the optional subject of study has a great influence in the critical thinking ability of higher secondary school students. The study also revealed that science students have more mean score compared to the students of commerce and humanities.

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