

## PEER TUTORING EXPLORING NEW PATHWAYS THROUGH DEVELOPING CRITICAL THINKING SKILLS IN SECONDARY SCHOOL STUDENTS

*Binu B.L*

*Principal, College of Teacher Education, Kerala University, Anchal, Kollam, Kerala, India*

---

**Received: 19 Aug 2018**

**Accepted: 31 Aug 2018**

**Published: 15 Sep 2018**

---

### **ABSTRACT**

*Critical thinking is the ability to think clearly and rationally about what to do or what to believe. It includes the ability to engage in reflective and independent thinking. Thinking critically is the ability to analyze a concept objectively, considering the facts and differing perspectives to reach a sound, logical conclusion. The constructivist teaching techniques, peer tutoring, scaffolding, cognitive apprenticeship, co-operative learning etc allows people to take change of their own learning knowledge about peer tutoring concerns a person's knowledge about personal cognitive resources and the compatibility between himself or herself as a learner and learning situation. Peer tutoring strategies facilitative learning how to learn. The investigator finds out the effectiveness of peer tutoring strategy for the development of thinking skill such as critical thinking, creativity, and problem solving among students at secondary level. A teacher can read by arranging for abler pupils to help less able one within a single class. The aim of the study was to find out whether the peer tutoring strategy is more effective than the prevailing method in teaching mathematics at the secondary level. With the support of their tutor and fellow students, learners must become skilled at assessing each source of information to determine its merit before using it as a reference. By helping students to cultivate critical thinking, we are sowing the seeds of a generation with a better-thinking capability that can help society*

**KEYWORDS:** *Peer Tutoring, Rational Thinking, Problem Solving, Critical Thinking, Cognitive Resources, Prevailing Method, Team-Building*

### **INTRODUCTION**

The global knowledge economy is driven by information and technology. One has to be able to deal with changes quickly and effectively. The new economy places increasing demands on flexible intellectual skills, and the ability to analyze information and integrate diverse sources of knowledge in solving problems. Critical thinking skills are able to understand the logical connections between ideas, identify, construct and evaluate arguments, detect inconsistencies and common mistakes in reasoning, solve problems systematically, identify the relevance and importance of ideas and reflect on the justification of one's own beliefs and values. Social constructionists support a view which merges the person and their boundaries for one cannot be easily separated from the boundaries of the other. What we take to be the world importantly depends on how we approach it, and how we approach it depends on the social relationship of which we are apart. Critical thinking is not a matter of accumulating information. A person with a good memory and who knows a lot of facts is not necessarily good at critical thinking. A critical thinker is able to deduce consequences from what he knows, and

he knows how to make use of information to solve problems and to seek relevant sources of information to inform himself. Critical thinking should not be confused with being argumentative or being critical of other people. Although critical thinking skills can be used in exposing fallacies and bad reasoning, critical thinking can also play an important role in cooperative reasoning and constructive tasks. Critical thinking can help us acquire knowledge, improve our theories, and strengthen arguments. We can use critical thinking to enhance work processes and improve social institutions. Constructivism is a part of the cognitive revolution. Constructivists believe that knowledge is the result of individual constructions of reality. The constructivist teaching techniques, peer tutoring, scaffolding, cognitive apprenticeship, co-operative learning etc allows people to take a change of their own learning knowledge about peer tutoring concerns a person's knowledge about personal cognitive resources and the compatibility between himself or herself as a learner and learning situation. An instructional strategy like peer tutoring can help the teachers to meet the challenges of successful students learning. In order to improve the learning in peer tutoring method, students should be arranged in a small and manageable group. Small group interactions also permit youngsters to solve problems in co-operation with other students so that they need not have fear of failure or embarrassment. Even if errors are made, sharing the responsibility with a group of peers sharply reduces tension or trauma. Further, the small group techniques help students to understand how other people reach decisions and work towards solutions. Finally, interaction with peers creates sound bonds which reflect ideas, build solutions and suggest the conclusion to the group and to the teacher (**Goodlad Sinclair & Beverley Hirst 1989**). Although peer help focused originally on academics, it becomes clear that social adjustment, behavior inconsistencies, and indeed self- concept could be enhanced by the use of peer models (**Fulk, K.L. 2006**). Hence the investigator finds out the effectiveness of peer tutoring strategy for the development of critical thinking skills among students at secondary level.

### **Objectives of the Study**

- To prepare and validate the instructional materials in Mathematics based on peer tutoring strategy for developing critical thinking skills among students at secondary level.
- To test the effectiveness of peer tutoring strategy by comparing the pre-test and post test critical thinking skill scores of peer tutoring strategy and prevailing method.

### **Hypothesis**

The peer tutoring strategy is effective in developing critical thinking skills among secondary school students.

### **METHODOLOGY**

The present study made use of pre-test by non-equivalent group experimental design for realizing the objectives. This design often used in classroom experiments when experimental and control groups are such naturally assembled groups as intact classes which may be similar (Best & Khan, 1999). The independent variables involved are peer tutoring strategy and prevailing method of teaching, while critical thinking skill was taken as the dependent variable. The study was conducted on a sample of 80 students studying in the 9<sup>th</sup> standard of secondary schools in Kollam District. Equal representation of male and female students, within possible lowest age range, was given while assigning subjects to experimental and control group. The study made use of systematically designed and well-planned lesson transcripts based on peer tutoring strategy and prevailing method for teaching the selected topic. A Standardised Achievement Test, prepared by the investigator as a part of the study, was used to measure the learning outcome of the groups.

Since the sample selected for the study were the non-equivalent group having differences in their means of pre-test scores, Analysis of Co-variance (ANCOVA) carried out to find out the significant differences between the Experimental Group and Control Group in the pre-test and post-test conditions.

## DISCUSSIONS

The post-test critical thinking scores were collected from both the control and experimental groups. The data were analyzed by comparing them. Also analyzed the mean gain critical thinking scores of pupils in the experimental and control groups. The details of the analysis are given below.

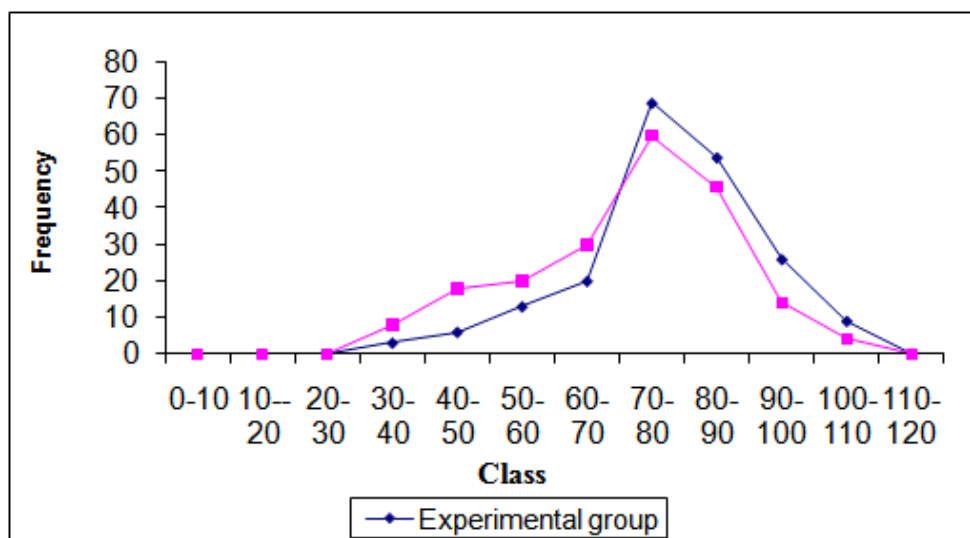
### Comparison of Post-Test Critical Thinking Scores of Pupils in Experimental and Control Groups

The mean and standard deviation of scores of critical thinking of 200 pupils in the experimental and control group were found out before and after peer tutoring session. The critical ratio was found out and tested for significance. The data and result of the test of significance are given in Table 1

**Table 1: The Result of Test of Significance of the Difference between Means of Critical Thinking Scores of Pupils in the Experimental and Control Groups**

Group	N	Mean	D	R	Level of Significance
Experimental	200	77.15	14.12	3.73	P > 0.01
Control	200	71.5	16.06		

The critical ratio 3.73 is significant at 0.01 level. This shows that there is a significant difference between the means of the critical thinking scores of the pupils in experimental and control groups. It means that the two groups differ significantly in their self-concept. So it can be concluded that the two groups are different in level in terms of critical thinking. The critical thinking scores of experimental and control groups are graphically represented in Graph 1



**Figure 1: The Frequency Distribution of the Critical Thinking Scores of Pupils in the Experimental and Control Groups**

### Comparison of Mean Gain Critical Thinking Scores of Pupils in the Experimental and Control Groups

The mean and standard deviation of gain scores of critical thinking of 200 pupils in the experimental and control group were found out before and after peer tutoring session. The critical ratio was found out and tested for significance. The data and result of the test of significance are given in Table 2

**Table 2: The Results of Test of Significance of the Difference between Mean Gain Critical Thinking Scores of Pupils in the Experimental and Control Groups**

Group	N	Mean	SD	R	Level of Significance
Experimental	200	7.3	3.5	14.08	P > 0.01
Control	200	2.7	3.3		

The mean gain self-concept of 200 pupils in experimental and control groups were 7.3 and 2.7 respectively with deviations of 3.5 and 3.3. It was observed that the mean gain significantly differed in both the control and experimental group with a critical value of 14.08 at 0.01 levels (Table 2)

### CONCLUSIONS

The Hypothesis of the study "*The critical thinking of pupils taught by Peer Tutoring Model (PTM) is significantly higher than that of pupils taught by the prevailing method*" was accepted based on the following findings. When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant (Critical ratio, CR = 3.73,  $P < 0.01$ ). The experimental group was found to be better than the control group. [Mean  $M_1$  for experimental group = 77.15 and Mean  $M_2$  for the control group = 71.5]. When the gain scores (post-test score – pre-test score) of pupils in the experimental and control group were compared, the difference between their means was found to be significant. (Critical ratio, CR = 14.08;  $P < 0.01$ ). The experimental group was found to be better than the control group [Mean  $M_1$  for experimental group = 7.3, and Mean  $M_2$  for the control group = 2.7].

The analysis of covariance of pre- and post-test scores of pupils in the experimental and control groups showed a significant difference between the two groups ( $F_{yx}$  for  $df\ 398 = 27.1$ ;  $P < 0.01$ ). The experimental group was found better than the control group in critical thinking ( $M_{1y_x} = 77.6$  and  $M_{2y_x} = 70.42$ ). The adjusted means ( $M_{1y_x} = 77.6$  and  $M_{2y_x} = 70.42$ ) for the post-test scores were tested for significance for  $df\ 397$ . The  $t$ -value obtained was significant at 0.01 level ( $t = 10.35$ ;  $P < 0.01$ ). The significant  $t$ -value confirms that the two means differ considerably. The conclusion is that the experimental group outweighed the control group in critical thinking. Thus the critical thinking of pupils taught by Peer Tutoring Model (PTM) was significantly higher than that of pupils taught in the prevailing method. Since the relationship between critical thinking and achievement of the learners has been established beyond controversy, the Peer Tutoring model of instruction is very effective than the conventional classroom teaching methods in ensuring high educational outcomes and also for attaining the higher instructional objectives in a meaningful manner.

## REFERENCES

1. Allison, C. (1997), *Co-operative learning and the second language learning classroom*. Retried March 19, 2005, from <http://www.cdli.ca/~achafe/cooplang.html>.
2. Best, J. W. & Khan, J. V. (1999). *Research in education* (7<sup>th</sup> ed.). New Delhi: Prentice Hall.
3. Cairo, L. & Craig, J. (2005). *Cross-age tutoring phase II-An experiment*. Edvanita: Appalachia Educational Laboratory.
4. Cairo, L. & Craig, J. (2005). *Cross-age tutoring phase II-An experiment*. Edvanita: Appalachia Educational Laboratory.
5. Studley, H. L. "The effect of concept mapping on critical thinking skills of baccalaureate nursing students." (2005): 0318-0318.
6. Damon, W. & Phelps, E. (1989). *Critical distinctions among three approaches: Peer Interaction, Problem-Solving, and Cognition: Multidisciplinary Perspectives*, Webb, N. M. (Ed.). New York: Pergamon Press, 9-19.
7. Fulk, K. L. (2006). *An investigation on peer tutoring in mathematics*. London: Crownin Press, Sage publications.
8. Goodlad Sinclair & Beverley Hirst (1989) *Peer tutoring :A guide to learning by Teaching*. New Nichrls Publishing
9. Susan Noffke & Bridget Somekh (2009). *Handbook of Educational Action Research*, Sage Publication Limited, London.
10. Tan, W. C. & Aris, B. (2006). *GLOOT model: A pedagogically enriched design framework of learning environment to improve higher order thinking skills*. *Association for the Advancement of Computing in Educational Journal*, 14(2), 139-153.

