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Effect of Ct And Tbct on The Academic Achievement of Secondary School Students

Education

KEYWORDS : Constructivist Teaching (CT), Technology Based Constructivist Teaching (TBCT), Academic Achiemvent, Impact, 5 E Model, Jigsaw

PARASURAMA. D Research Scholar, Christ University, Bangalore.

Dr. S. Srikanta Swamy Professor & Additional Director, Centre for Research, Christ University, Bangalore

ABSTRACT

The objective of the study is to compare the effect of CT and TBCT on the academic achievement of secondary school students. In this study two equivalent group design is considered. In which group -1 is exposed to Constructivist Teaching (CT) and group-2 is exposed to Technology Based Constructivist Teaching (TBCT). The sample comprised of 156 students studying in IX standard of two schools (Government and Private) of Bangalore city. Researcher identified and collected topics from the school and developed CT and TBCT modules considering 5 E Learning model, Jigsaw and Integration of Technology. Intervention of CT and TBCT carried by engaging the students in Home and Expert group, and students were exposed to knowledge construction activities. Researcher developed the Daily Assessment Sheet (DAS), Unit Test and Post-Test to measure the academic achievement of students. Researcher developed the Achievement test based on the Blue Print and approval from the subject experts, to measure the academic achievement of students. Finally post-test was administered to assess the effectiveness of the intervention. The findings of the study are CT and TBCT intervention helped the students to perform better in post-test, TBCT approach is more effective than CT approachto enhancing the academic achievement of students.CT and TBCT approach have not influenced by the gender in private school whereas only TBCT group was influenced by the gender in government school.

INTRODUCTION

Recent practices in education paved the way for innovative and learner centered environment in schools.Constructivist teaching is an emerging approach and leading philosophical perspective in contemporary educational scenario.Its main focus is to nullify the teacher dominated traditional classroomteaching and initiate learner owner ship in their learning. Constructivism believes that "All knowledge is constructed from a base of prior knowledge and children are not blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions. They learn best when they are allowed to construct a personal understanding on experiencing things and reflecting on those experiences"(Singh, 2011). Its central idea is contrary to traditional approach and opposes memorization and rote learning.In this way "In constructivist learning, student is expected to produce his/her own product by searching, making decisions, collaborating, using high level thinking skills and using his/her own creativeness"(Bogar, Kalender, & Sarikaya, 2012). The approach also holds that teacher provides a situation where they interact with their prior knowledge and form new mental model individuallyor collectively in collaborative group. Overall constructivist teaching proposes learner driven learning environment.

Comprehensive literature survey also witness the significance of constructivist teaching in education. Studies revealed that Constructivist learning impacts on achievement and retention (Memirci, 2009), central element of constructivist epistemology advances the implementation of teaching learning strategies that facilitate the construction of knowledge (Hartifield, 2010), Constructivist teaching is an effective approach and equally effective for low, average and high achievers as well as for both boys girls in improving their problem solving skills (Padmanabhan & Rao, 2011), constructivist teaching is effective than the traditional approach and helps in developing thinking, social and learning skills in the teaching of English (Shetty, 2013). Constructivist teaching is effective than traditional approach in improving the students learning (Malik, Khurshid, Rehana, & Nazim, 2013).

Today's Technology opens new era in knowledge and information society and it acts like a driving force in education.Besides, technology usage and its integration emerged as one of the important component of education along with the pedagogical knowledge. From literature survey it is evident that,in many researchesthe technology related areas like computer technology, multimedia, video based lesson and e-content etc. increases the study habit of students (V. Nimavathi & R. Gnanadevan, 2009), computer with teacher support group has the most significant effect on the pupils achiemvent (Kumar & Ambedkar, 2006), learner learned through e-content method are at a higher level in the achievement (Jebaraj & Sundram, 2008). From above studies, it is clear that technology has created learner friendly environment for learners. According to Powell and Powell (2010) "Technology is used to facilitate or mediate the teaching learning process. When they infused into the curriculum the teacher's role shifts from being primarily an information source to facilitator, a coach a guide, and a co-learner".

From the above discussion Constructivist teaching also exercises and withstands same view and belief about teaching and learning."What students learn in the classroom is dependent (though not wholly) on their prior expectations, particularly on their previous learning including learnt misconceptions"(Swann, 2012). ; Constructivist learning process is always guided by the teacher(Mishra & Jain, 2011)Teacher is a facilitator or a coach who guides the student's critical thinking, analysis and synthesis abilities throughout the learning process.

Thus, technology based teaching as well as constructivist teaching considered "learners are sense makers and teacher as cognitive guide". In this way there is a need to Integrate or blend constructivist teaching and technology in classroom. Gensburg and Herman (2012) viewed in their article that "Technology enhanced constructivist learning environment, offers many opportunities to engage students in authentic, complex and guided learning interactions". SimilarlyIsmail, Gilakjani, & Leong (2013) opined based on previous research studies that "Using technology in a constructivist approach, teachers can involve students in learning activity, they can structure the instruction to meet different learning levels and styles, and they can broaden the range of resources that are available to learners". Therefore, blend of such novel practices offering lot of opportunity for technologically rich knowledge construction activities in classroom.From the literaturesurvey it was found that many studies are conducted separately in Constructivism and Technology related to academic achievement.Research gap is found with respect to the impact of CT and TBCT on academic achievement of secondary school students. Hence, the researcher has made an attempt to carry on the present research.

KEY TERMS USED IN THIS STUDY

CONSTRUCTIVIST TEACHING(CT):

"Constructive perspective learning is a process of construction of knowledge. Learners actively construct their own knowledge by connecting new ideas to existing ideas on the basis of material/activities presented to them". Teacher creates educational environment for students to use their prior knowledge, experience and model to make meaning in learning new knowledge and understanding.

There are three types of constructivism namely cognitive, social and radical constructivism. Cognitive constructivism emphasis individual way of construction of knowledge based on prior knowledge; in social constructivism knowledge construction proceeds collectively and collaboratively in the group and it focus on languageusage and interaction by group members; whereas radical constructivism is subjective nature of construction of knowledge. In the study constructivist teaching refers to method of providing facilities to make learners to construct their own knowledge based on social constructivism.

TECHNOLOGY BASED CONSTRUCTIVIST TEACHING (TBCT):

It refers to an approach in which the researcher integrates technology in constructivist teaching.

5 E'S MODEL: It is an approach in which the teacher follows five 'E's model (Engage, Explore, Explain, Elaborate, and Evaluate) to facilitate the learners to create their own knowledge. It was developed by Roger Bybee.

IMPACT:

It refers to the effect of CT and TBCT on the Academic Achievement of students studying in secondary school level.

JIGSAW:

Jigsaw is a cooperative learning technique in which students engaged in learningthrough home group and expert group activity.

ACADEMIC ACHIEVEMENT:

It refers to the achievement of students in selected topics of Social Science carried out for the purposes of CT and TBCT.

VARIABLES OF THE STUDY:

In the present study there are two types of variables are considered, i.e. independent variable and dependent variable. Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT) are independent variables whereas academic achievement in Social Science is dependent variable. Gendered is termed as a biographic variable.

OBJECTIVES OF THE STUDY:

1. To find out the impact of Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT) on Academic Achievement.
2. To find out whether there would be any difference between boys and girls with respect to their academic achievement.

HYPOTHESES: The following are the hypotheses of the study

1. There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Constructivist Teaching (CT) with respect to Experimental Group-1 of Government school.
2. There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Technology Based ConstructivistTeaching (TBCT) with respect to Experimental Group-2 of Government school.
3. There is no significant difference between the post-test mean scores of academic achievement of students taught by CT and TBCT with respect to Experimental group-1 and Experimental group-2 of government schoolrespectively.
4. There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Constructivist Teaching (CT) with respect to Experimental Group-1 of Private school.
5. There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Technology Based Constructivist Teaching (TBCT) with respect to Experimental Group-2 of Private school.
6. There is no significant difference between the post-test mean scores of academic achievement of students taught by CT and TBCT with respect to Experimental group-1 and Experimental group-2 of Private school respectively.
7. There is no significant difference between thepost-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-1 of government school.
8. There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by TBCT with respect experimental group-2 of government school.
9. There is no significant difference between the post-test mean scores of academic achievementof boys and girls taught by CT with respect experimental group-1 of private school.
10. There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by TBCT with respect experimental group-2 of private school.

DESIGN OF THE STUDY:

In this study two equivalent group design is considered. In which group -1 is exposed to Constructivist Teaching and group-2 is exposed to Technology Based Constructivist Teaching (TBCT).

SAMPLING:

The sample comprised of 156 students studying in IX standard of two schools (Government and Private School) of in Bangalore city. For the purpose of experimentation, based on their previous academic achievement, they were further divided into two groups.

DEVELOPMENT OF CT & TBCT MODULE:

Researcher identified and collected IX standard Social Science topics from the schools and developed modules on Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT)based on Social Constructivism. CT modules are developed by considering 5E Learning model and Jigsaw, whereas TBCT modules are developed using 5 E learning module, Jigsaw and integration of technology. Modules were scrutinized and assessed by guide, subject experts and experts in the area of Constructivism and Technology. Accordingly 32 modules were validated and finalized. Modules detailsare presented in following table. Few modules are tried out in a school to know their effectiveness.

Table A: Description of CT and TBCT Modules.

Type of Module	Components	Subjects Covered	Total Number of Module Taught
CT Modules	5 E learning module + Jigsaw	o History – 4 Modules o Geography – 5 Modules o Political Science – 3 Modules o Economics – 4 Modules	16 Modules

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TBCT Modules	5 E learning module + Jigsaw + Integration of Technology	o History – 4 Modules o Geography – 5 Modules o Political Science – 3 Modules o Economics – 4 Modules	16 Modules

EXPERIMENTAL PROCEDUR E:

The study is carried out by selecting two schools and in each school two groups were formed namely Experimental Group-1(CT) and Experimental Group-2(TBCT). Groups are equated based on their previous academic achievement. Then ExperimentalGroup-1 was exposed to CT modules based on knowledge construction activity. The Experimental Group-2 was engaged in knowledge construction activity based on TBCT module. The multimedia technology such as Audio, video, Audio-video, animated picturesand PPT were used in TBCT classroom. Finally,daily assessment tests, unit tests and post-test were administered to assess the effectiveness of the intervention. The scores obtained by the students were feed into MS excel sheet for easy analysis using SPSS.

TOOLS USED IN THE STUDY:

Researcher developed the Daily Assessment Sheet (DAS), Unit Test and Post-Test to measure the academic achievement.Daily Assessment Sheets were validated with the help of expert and guide. Unit Test and Post- Test were developed based on the Blue Print and approval from the subject experts.

STATISTICAL TECHNIQUE USED:

Keeping the objectives and the hypothesis, the data collected from schools were analyzed using t-test.

ANALYSIS AND FINDINGS:

Hypothesis 1: There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Constructivist Teaching (CT) with respect to Experimental Group-1 of Government school.

Table 1:Indicates number, mean, standard deviation, t-value, p-value and significance level for pre-test and post-test mean scores of academic achievement of CT group of government school.

Academic Achievement	N	Mean	Std. Deviation	t-value	p-value	S/NS
Pre-Test	40	13.9500	3.19415	5.677	.000	S**
Post-Test	40	16.9750	4.70944			

S ** Significant at .01 level

From the above table it is evident that, the obtained 'p' is (t=5.677, p-value <.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which mean there is a significance difference between the pre-test and post-test means scores of academic achievement of experimental group -1with respect to government school. It can be seen that mean gain score difference favors towards post-test, therefore treatment has influenced on students' academic achievement.

Hypothesis 2: There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Technology Based Constructivist Teaching (TBCT) with respect to Experimental Group-2 of Government school.

Table 2:Indicates number, mean, standard deviation, t-value, p-value and significance level for pre-test and post-test mean scores of academic achievement of TBCT group of government school.

Academic Achievement	N	Mean	Std. Deviation	t-value	p-value	S/NS
Pre-Test	40	13.6750	2.73053	10.355	.000	S**
Post-Test	40	19.6000	3.48477			

From the a bove table it is evident that, the obtained 'p' is (t=10.355, p-value <.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which means there is a significance difference between the pre-test and post-test means scores of academic achievement of experimental group -2 with respect to government school. It can be seen that mean gain score difference favors towards post-test, therefore TBCT treatment has influenced on students' academic achievement.

Hypothesis 3: There is no significant difference between the post-test mean scores of academic achievement of students taught by CT and TBCT with respect to Experimental group-1 and Experimental group-2 of government school respectively.

Table 3:Indicates number, mean, standard deviation, t-value, p-value and significance level ofpost-test mean scores of academic achievement of CT and TBCT group of government school.

Groups	N	Mean	Std. Deviation	t-value	p-value	S/NS
Exp Group (CT) -1	40	16.9750	4.70944	2.834	.006	S**
Exp Group(TBCT)-2	40	19.6000	3.48477			

From the above table, it is evident that, the obtained 'p' is (t=2.834, p-value <.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which means there is a significance difference in the mean scores of academic achievement of Experimental -1 and Experimental Group-2 with respect to government school. It can be seen that mean gain score difference favors towards TBCT group, therefore TBCT approach found to be more effective than the CT approach in government school.

Hypothesis 4: There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Constructivist Teaching (CT) with respect to Experimental Group-1 of Private school.

Table 4:Indicates number, mean, standard deviation, t-value, p-value and significance level for pre-test and post-test mean scores of academic achievement of CT group of private school.

Academic Achievement	N	Mean	Std. Deviation	t-value	p-value	S/NS
Pre-Test	39	15.0256	3.60181	5.228	.000	S**
Post-Test	39	18.0256				

From the above table it is evident that, the obtained 'p' is (t=5.228, p-value <.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which mean there is a significance difference between the pre-test and post-test means scores of academic achievement of experimental group -1with respect to private school. It can be seen that mean gain score difference favors towards post-test, therefore CT treatment has influenced on students' academic achievement.

Hypothesis 5: There is no significant difference between pre-test and post-test mean scores of academic achievement of students taught by Technology Based Constructivist Teaching (TBCT) with respect to Experimental Group-2 of Private school.

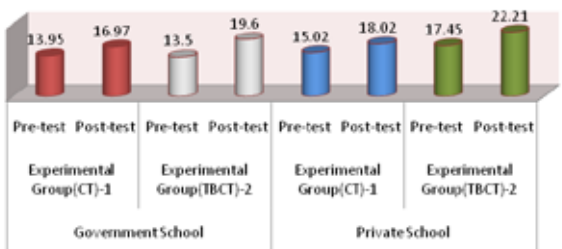
Table 5:Indicates number, mean, standard deviation, t-val-

ue, p-value and significance level for pre-t est and post-test mean scores of academic achievement of TBCT group of private school.

Academic Achievement	N	Mean	Std. Deviation	t-value	p-value	S/NS
Pre-Test	37	17.4595	4.50058	5.830	.000	S**
Post-Test	37	22.2162	2.20019			

From the above table it is evident that, the obtained 'p' is (t=5.830, p-value <.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which means there is a significance difference between the pre-test and post-test means scores of academic achievement of experimental group -2 with respect to private school. It can be seen that mean gain score difference favors towards post-test, therefore TBCT treatment has influenced on students' academic achievement.

Graph 1: Pre-test and Post-test mean scores of Academic Achievement of Experimental Group-1 and Experimental Group-2 of Government and Private School.



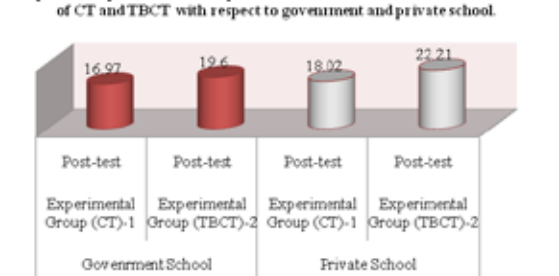
Hypothesis 6: There is no significant difference between the post-test mean scores of academic achievement of students taught by CT and TBCT with respect to Experimental group-1 and Experimental group-2 of Private school respectively.

Table 6:Indicates number, mean, standard deviation, t-value, p-value and significance level of post-test mean scores of academic achievement of CT and TBCT group of private school.

Groups	N	Mean	Std. Deviation	t-value	p-value	S/NS
Exp Group (CT) -1	39	18.0256	2.94232	7.002	.000	S**
Exp Group(TBCT)-2	37	22.2162	2.20019			

From the table it is evident that, the obtained 'p' is (t=7.002, p-value <.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which means there is a significance difference in the post-test mean scores of academic achievement of Experimental -1 and Experimental Group-2 with respect to private school. It can be seen that mean gain score difference favors towards TBCT group, therefore TBCT approach found to be more effective than the CT approach.

Graph 2: Comparision between post-test mean scores of academic achievement of CT and TBCT with respect to government and private school.



Hypothesis 7: There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-1 of government school.

Table 7:Indicates number, mean, standard deviation, t-value, p-value and significance level of post-test mean scores of academic achievement of boys and girls of CT group of government school.

Sub-Sample	Gender	N	Mean	Std. Deviation	t-value	p-value	S/NS
Experimental Group(CT) -1	Boys	24	16.9167	4.46159	.095	.925	NS*
	Girls	16	17.0625	5.20857			

NS* - Significant at 0.05 level

From the table, it is evident that, the obtained 'p' for Experimental Group-1 is (t=.095, p-value >.05) higher than .05. Hence,null hypothesis is accepted and alternative hypothesis is rejected. Which means there is no significance difference between post-test mean scores of academic achievement of boys and girls taught by CT with respect to government school. It means gender doesn't influence on CT approach.

Hypothesis 8: There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by TBCT with respect experimental group-2 of government school.

Table 8: Indicates number, mean, standard deviation, t-value, p-value and significance level of post-test mean scores of academic achievement of boys and girls of TBCT group of government school.

Sub-Sample	Gender	N	Mean	Std. Deviation	t-value	p-value	S/NS
Experimental Group(TBCT) -2	Boys	27	18.4815	2.66560	3.269	.002	S**
	Girls	13	21.9231	3.92559			

From the table, it is evident that, the obtained 'p' value for Experimental Group-2 is (t= -3.269, p<00.01) less than .01. Hence, null hypothesis is rejected and alternative hypothesis is accepted. Which means there is a significance difference in the mean scores of academic achievement of boys and girls in TBCT group of government school.

Hypothesis 9: There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-1 of private school.

Table 9:Indicates number, mean, standard deviation, t-value, p-value and significance level of post-test mean scores of academic achievement of boys and girls of CT group of private school.

Sub-Sample	Gender	N	Mean	Std. Deviation	t-value	p-value	S/NS
Experimental Group(CT) -1	Boys	24	18.4583	3.36192	1.167	.251	S*
	Girls	15	17.3333	2.02367			

From the table, it is evident that, the obtained 'p' for Experimental Group-1 is (t=1.167, p-value >.05) higher than .05. Hence, null hypothesis is accepted and alternative hypothesis is rejected. Which means there is no significance

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difference in the mean scores of academic achievement of boys and girls taught through CT with respect to private school

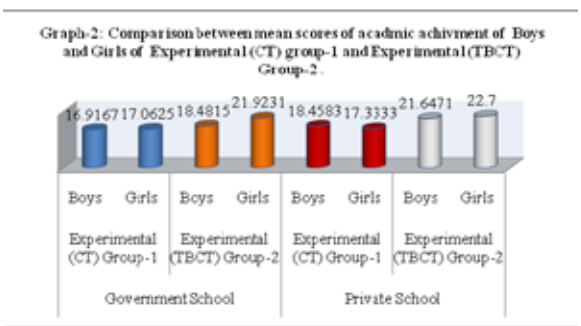
Hypothesis 10: There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-2 of private school.

Table 10:Indicates number, mean, standard deviation, t-value, p-value and significance level of post-test mean scores of academic achievement of boys and girls of TBCT group of private school.

Sub-Samples	Academic Achievement	N	Mean	Std. Deviation	t-value	p-value	S/NS
Experimental Group(TBCT) -2	Boys	17	21.6471	2.71434	1.474	.149	NS*
	Girls	20	22.7000	1.55935			

S* - Significant at 0.05 level

From the table, it is evident that, the obtained 'p' for Experimental Group-2 is (t=1.474, p-value>.05) higher than .05. Hence, null hypothesis is accepted and alternative hypothesis is rejected. Which means there is no significance difference in the mean scores of academic achievement of boys and girls taught through TBCT with respect to private school



Findings: Following are the some of the major findings of the study.

1. There is a significant difference between pre-test and post-test mean scores of academic achievement of students taught by Constructivist Teaching (CT) with respect to Experimental Group-1 of Government school.
2. There is a significant difference between pre-test and post-test mean scores of academic achievement of students taught by Technology Based Constructivist Teaching (TBCT) with respect to Experimental Group-2 of Government school.
3. There is a significant difference between the post-test mean scores of academic achievement of students taught by CT and TBCT with respect to Experimental group-1 and Experimental group-2 of government school respectively.
4. There is a significant difference between pre-test and post-test mean scores of academic achievement of students taught by Constructivist Teaching (CT) with respect to Experimental Group-1 of Private school.
5. There is a significant difference between pre-test and post-test mean scores of academic achievement of students taught by Technology Based Constructivist Teaching (CT) with respect to Experimental Group-2 of Private school.
6. There is a significant difference between the post-test mean scores of academic achievement of students taught by CT and TBCT with respect to Experimental group-1 and Experimental group-2 of Private school respectively.
7. There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-1 of government school.
8. There is a significant difference between the post-test mean scores of academic achievement of boys and girls taught by TBCT with respect experimental group-2 of government school.
9. There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-1 of private school.
10. There is no significant difference between the post-test mean scores of academic achievement of boys and girls taught by CT with respect experimental group-2 of private school.

Conclusion:

From the findings of the study, it can be concluded thatCT and TBCT approaches helped the students to perform better in post-test of both the schools. In addition, findings revealed that TBCT approach is more effective than the CT approach in enhancing the academic achievement of students. It means, blend of technology and constructivist teaching provided greater opportu-

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