

Enhancing Academic Achievement of Students Through Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT)

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Abstract:

The present school education system emphasis on constructivist education environment. It is learner centered education, considers students are not as passive learners but active constructors of knowledge. In the same way, the education system also stresses on the use of technology in teaching - learning process. Alongside, technology also supports and help in knowledge construction. Thus, integration of technology in constructivist approach provides new stage for construction of knowledge. In this study, attempt is made to study the impact of Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT) on academic achievement of IX standard students in economics subject studying in government school. For the purpose of experimentation, groups are equated based on their previous academic achievement and further divided into experimental group-1 and 2. Researcher identified and selected suitable topics from the school, and CT and TBCT modules were developed and validated with the help of experts. Finally, experimentation was carried out in the school. The impact of modules were assessed through using achievement (Unit-Test) test. The major findings of the study are TBCT approach is more effective in improving the academic achievement of students in the subject economics compared to CT approach in government school. Gender and IQ has influenced more on academic achievement of students taught by CT compared to TBCT.

Keywords: Constructivist Teaching, Technology Based Constructivist Teaching, Impact, Academic Achievement

I. INTRODUCTION

The present school education system lay emphasis on constructivist education environment. It is the learner centered educational environment which considers students are not as passive learners but active constructors of knowledge. The focus here is, the students construct their views, thoughts and understanding based on the ideas already known to them. Jean Piaget, the pioneer in the field of constructivism rightly envisaged that "Cognitive growth only occurs when children construct their own knowledge". Children need opportunities to figure out things on their own (Cari, 2000). Really, such practices are required as emerging trends for school system. Ornstein, Levine, Gutek and Vocke (2011) reported that constructivism is an innovation process, in which children interact with their environment and build their world knowledge. They discover the inadequacy in their existing concepts and new situation and by exploring environment they reconstruct or conceptualize their knowledge. So, classroom activities are "shifting from instruction to construction and knowledge instruction to knowledge construction" (Sandholtz, Ringstaff, & Dwer, 1997). In this way constructivism brought change in educational practice. In fact, constructivist practice is also envisaged in our National Curriculum Framework 2005.

It was also a clear evident from the literature review that constructivism is recent emerging practice in education. The studies showed that constructivist principle based environment is more effective than traditional approach of teaching (Karaduman & Gultekin, 2007); constructivist approach is effective in improving understanding and processing skills among students (Sridevi, 2008);

constructivist group is more effective in developing attitude towards human right when compared to control group (Gundogdu, 2010); constructivist model helps student to store their conceptions in their long-term memory (Calik, Ayas & Coll, 2010); constructivist approach is more effective than traditional approach in enhancing the creativity in students (Nayar & Senapathy, 2011); constructivist group performed higher in quiz scores and attitude scores compared to control group (Rmaulu, 2015)

Like constructivism, technology and its integration influenced on present educational space. Today computer technologies are not only used for drill, practice, tutorial and gaming but also for innovative purpose like simulation, discovery learning and problem solving. These modes are called computer assisted instruction. The contemporary era also indicate that there is need to use technology tools for knowledge construction. Gance (2002) expressed that "Technology is inherently constructivist and encouraging its use uncritically in classroom or as replacement for teachers". Experts in the field of educational technology also pleased and identified tools for constructivist teaching. They are, PPT based creative and engaging project, problem based activities as tool for constructivism (Finkelstein & Samsonov, 2008); word processing, databases, spreadsheets hypermedia applications, and multimedia can lead opportunities for students problem solving and critical thinking (Sandholtz, Ringstaff, & Dwer, 1997); LOGO programme developed by Seymour Papert's engages students in constructivist practice (Talawar & Kumar, 2009); cognitive tutors and collaborative computer-based environments are helpful engaging students in knowledge

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construction (Moreno, 2010); commonly used application software's such as word processing, spreadsheet, database software, presentation graphic software and instructional software's helps development of constructivist classroom (Sharma, 2013). Thus need to understand and realize the inherent reality of using constructivism and technology components in imparting education and engaging students in knowledge construction. On the similar note, there is a real need for integrating technology components in constructivist practice. In the same line, the present study is conducted to study the impact of Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT) on academic achievement of IX standard students in economics subject. In this article only unit test scores of economics subject and IQ scores were considered.

II. VARIABLES OF THE STUDY

The study considered two variables i.e, independent variable and dependent variable. Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT) are independent variables and academic achievement in economics subject is dependent variable. IQ and gender are treated as moderate variables.

III. OBJECTIVES OF THE STUDY

The objectives considered in this article are

1. To find out the impact of Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT) on Academic Achievement of IX standard students in economics subject.
2. To find out whether there would be any difference between male and female students with respect to their academic achievement in economics subject taught by CT and TBCT.
3. To find out whether there would be any difference between high and low IQ students with respect to their academic achievement in economics subject taught by CT and TBCT.

IV. HYPOTHESES OF THE STUDY

1. There is no significant difference between the mean scores of academic achievement of students in economics subject taught by CT and TBCT with respect to experimental group-1 and experimental group-2 of government school.
2. There is no significant difference between the mean scores of academic achievement of boys and girls in economics subject taught by CT with respect to experimental group-1 of government school.
3. There is no significant difference between the mean scores of academic achievement of boys and girls in economics subject taught by TBCT with respect to experimental group-2 of government school.
4. There is no significant difference between the mean scores of academic achievement of High and Low IQ students in economics subject taught by CT with respect to experimental group-1 of government school.

5. There is no significant difference between the mean scores of academic achievement of High and Low IQ students in economics subject taught by TBCT with respect to experimental group-2 of government school.

Design of the study

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

Sampling Procedure

The sample comprised of 80 students studying in IX standard of a government school in Bangalore city. For the purpose of experimentation, based on their previous academic achievement, they were further divided into two groups, such that in each group there are 40 students.

Tools Used

In this study, a unit-test was constructed to measure the academic achievement of students in economics subject. It was constructed and validated with the help of guide, subject experts and professors of B.Ed. College. RPM test was used to test the IQ of students. Mean and standard deviation scores of IQ were considered to classify the students into high and low IQ category.

Development of CT & TBCT Modules

Researcher identified and selected IX standard Social Science topic related to economics from the school and developed modules on Constructivist Teaching (CT) and Technology Based Constructivist Teaching (TBCT). CT modules are developed by considering 5E's Instructional Model and Jigsaw, whereas TBCT modules are developed using 5 E's Instruction module, Jigsaw and technology components (PPT, Text, Audio, Audio Visual, Multimedia, Hypermedia, Hyperlinks). In both the modules constructivist assessment, ZPD and Scaffolding are considered as basic components. In the case of TBCT module researcher kept TPACK (Technological Pedagogical Content Knowledge) approach for integration of major and basic components in development of TBCT module. Both the modules were validated with the help of guide, subject experts and experts in constructivist teaching and experts in technology.

Experimental Procedure

The entire experimental procedure was validated and conducted in three phases. Phase I is Pre-intervention phase - in this phase researcher identified the school and collected the IX standard social sciences syllabus. Later researcher developed and validated the CT and TBCT module with the help of experts. Phase II includes activities namely tryout of the module; orientation about nature of the CT and TBCT module to class; administration of pre-test and IQ test; intervention of CT module to experimental group-1 and followed by intervention of TBCT module to experimental group-2; and administered the unit-test after each unit. Phase-III is Post-Phase, which includes administration of post-test, CT and TBCT rating scale.

In the present article only Unit-test scores of economics subject is considered to measure the effectiveness of intervention of CT and TBCT. IQ scores were used to classify the student into high and low IQ category.

Data Analysis

The data was analyzed by using SPSS.

Analysis and Interpretation

Hypothesis 1: There is no significant difference between the mean scores of academic achievement of students in Economics subject taught by CT and TBCT with respect to experimental group-1 and experimental group-2 of government school.

Table-1 : t-Test Results Comparing Mean Scores of Academic Achievement of Students in Economics Subject Taught by CT and TBCT With Respect to Experimental Group-1 and Experimental Group-2 of Government school.

Category	N	Mean	SD	Value		Significant level – p value
				t-Value	'p' value	
CT	40	12.6500	5.27962	-3.488	.001	S**
TBCT	40	15.9000	2.61945			

S** – Significant at 0.01 & .05

From the above table it is evident that, the obtained p value is ($p < .05$) less than the .05 level of significance. Hence, the null hypotheses is rejected and alternative hypotheses is accepted. Which means, there is a significant difference between academic achievement mean scores of CT and ($M = 12.65$, $SD = 5.2792$) and TBCT ($M = 15.90$, $SD = 2.61945$) group at .05 level of significance $t(78) = -3.4888$, $p = .001$. It can also be seen that the mean gain score favors TBCT group, it indicate that, the students of TBCT group higher scored in mean scores of achievement compare to CT group. Thus, TBCT intervention found to be more effective than the CT approach in improving academic achievement of students in Economics.

Hypothesis 2: There is no significant difference between the mean scores of academic achievement of boys and girls in Economics subject taught by CT with respect to experimental group-1 of government school.

Table-2 : t-Test Results Comparing Mean Scores of Academic Achievement of Boys and Girls in Economics Subject Taught by CT with respect to Excremental Group-1 of Government school.

Gender	N	Mean	SD	Value		Significant level – p value
				t-Value	'p' value	
Boys	24	11.0833	3.85517	-2.221	.037	S*
Girls	16	15.0000	6.31401			

S* - Significant at 0.05

From the above table it is evident that, the obtained p value is ($p < .05$) less than the .05 level of significance. Hence, the null hypotheses is rejected and alternative hypotheses is accepted. Which means, there is a significant difference between mean scores of academic achievement of boys ($M = 11.0833$, $SD = 3.85517$) and girls ($M = 15.00$, $SD = 6.311401$) taught by CT with respect experimental group-1 at .05 level of significance, $t(38) = -2.221$, $p = .037$. It can be seen that mean

gain score of academic achievement favors girls, therefore girls performed higher compared to boys. Thus, gender has influenced on CT approach.

Hypothesis 3: There is no significant difference between the mean scores of academic achievement of boys and girls in Economics subject taught by TBCT with respect to experimental group-2 of government school.

Table-3 : t-Test Results Comparing Mean Scores of Academic Achievement of Boys and Girls in Economics Subject Taught by TBCT with respect to Excremental Group-2 of Government School.

Category	N	Mean	SD	Value		Significant level – p value
				t-Value	'p' value	
Boys	27	15.4815	2.84700	-1.478	.148	NS
Girls	13	16.7692	1.87767			

From the above table it is evident that, the obtained p value is ($p > .05$) higher than the .05 level of significance. Hence, the null hypothesis is accepted and alternative hypotheses is rejected. Which means, there is no significant difference between mean scores of academic achievement of boys ($M = 15.4815$, $SD = 2.847$) and girls ($M = 16.7692$, $SD = 1.87767$) taught by TBCT with respect experimental group-2 at .05 level of significance, $t(38) = -1.478$, $p = .148$. It means gender doesn't influence on TBCT approach.

Hypothesis 4: There is no significant difference between the mean scores of academic achievement of High and Low IQ students in economics subject taught by CT with respect to experimental group-1 of government school.

Table-4 : t-Test Results Comparing Mean Scores of Academic Achievement of High IQ and Low IQ Students in Economics Subject Taught by CT with respect to Excremental Group-1 of government school.

Category	N	Mean	SD	Value		Significant level – p value
				t-Value	'p' value	
High IQ	22	14.3182	5.26793	2.332	.025	S**
Low IQ	18	10.6111	4.65440			

From the above table, it is evident that, the obtained p value is ($p < .05$) less than the .05 level of significance. Hence, the null hypotheses is rejected and alternative hypotheses is accepted. Which means, there is a significant difference between the mean scores of academic achievement High IQ ($M = 14.3182$, $SD = 5.26793$) and Low IQ students ($M = 10.6111$, $SD = 4.65440$) taught by CT with respect experimental group-1 of government school at .05 level of significance, $t(38) = 2.332$, $p = .025$. It can be seen that mean gain scores favors High IQ level, therefore CT approach is influenced by IQ levels, the students with High IQ performed better in the post-test compared to Low IQ students taught using CT approach.

Hypothesis 5: There is no significant difference between the mean scores of academic achievement of High and Low IQ students in Economics subject taught by TBCT with respect to experimental group-2 of government school.

Table-5 : t-Test Results Comparing Mean Scores of Academic Achievement of High IQ and Low IQ Students in Economics Subject Taught by TBCT with respect to Excremental Group-2 of government school.

Category	N	Mean	SD	Value		Significant level – p value
				t-Value	'p' value	
High IQ	28	16.0357	2.61735	.496	.623	NS
Low IQ	12	15.5833	2.71221			

From the above table, it is evident that, the obtained p value is ($p > .05$) higher than the .05 level of significance. Hence, the null hypothesis is accepted and alternative hypotheses is rejected. Which means, there no significant difference between the mean scores of academic achievement High IQ ($M = 16.0357$, $SD = 2.61735$) and Low IQ students ($M = 15.5833$, $SD = 2.71221$) taught by TBCT with respect experimental group-2 of government school at .05 level of significance, $t(38) = .496$, $p = .623$. It means IQ doesn't influence on TBCT approach.

V. FINDINGS

1. There is a significant difference between the mean scores of academic achievement of students in Economics subject taught by CT and TBCT with respect to experimental group-1 and experimental group-2 of government school.
2. There is a significant difference between the mean scores of academic achievement of boys and girls in Economics subject taught by CT with respect to experimental group-1 of government school.
3. There is no significant difference between the mean scores of academic achievement of boys and girls in Economics subject taught by TBCT with respect to experimental group-2 of government school.
4. There is a significant difference between the mean scores of academic achievement of High and Low IQ students in Economics subject taught by CT with respect to experimental group-1 of government school.
5. There is no significant difference between the mean scores of academic achievement of High and Low IQ students taught by TBCT with respect to experimental group-1 of government school.

VI. CONCLUSION

The study found that the students taught through TBCT approach performed better in academic achievement in Economics compare to CT approach. It shows that, TBCT intervention helps enhancing students' academic achievement compare to CT approach. It clearly indicates that, the students were focused more in knowledge construction in the TBCT group with the help of technology component (integration of technology) along with the 5 E's Instructional model, Jigsaw, constructivist assessment, scaffolding and ZPD. The study also reveals that CT approach is influenced the gender and IQ. Whereas TBCT was not influenced by gender and IQ.

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