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STUDY OF MULTIPLE LINEAR REGRESSION ANALYSIS ON THE IMPACT OF LEARNING TECHNIQUES ON THE ACADEMIC ACHIEVEMENT SCORE IN SOCIAL SCIENCE OF SECONDARY SCHOOL STUDENTS

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Abstract

The present era understands a revolution in the field of education. The great demand of Mass education, it is important to introduce new techniques of learning and to provide reliable instructional material based upon the findings of educational technology. Learning is the process whereby knowledge is created through transformation of experience (Kolb, 1984). This definition implies that the curricula of school Social Science subject must be structured and sequenced. In particular, how the session or whole course may be taught to improve student learning.

Hence teaching strategies has to be changed as you send to the challenge posed by 'knowledge explosion' and increasing demand of the society. Learning of Social Science can be made effective by means of changing the teaching strategies and by adopting research-based practices effective teaching strategy in constructivism. Researches were induced to take up study on effectiveness of three major modules based on constructivist approach. Those are cooperative learning strategy, collaborative learning strategy and 5 'E' model approaches on achievement in social science of secondary school students.

Therefore, this study aims at developing and validating instructional strategies based on constructivism to teach social science on the other hand ascertain the effectiveness of these constructivist instructional strategies on the achievement of students in social science in terms of the knowledge constructed and transfer of constructed knowledge. This study targets secondary level students, as this stage forms the foundation of our education system. Execution and effectiveness of the new teaching strategy was analysed by using statistical analysis of Regression model.

Key words : Cooperative learning, Collaborative learning, 5 "E" learning, Social Science

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Introduction

Social Science is called humanities. It shapes our culture. Social science is gateway and keys to all subjects. As Benjamin Franklin said that what Science can do, better than more Nobel, more excellent, useful for men for more admirable things can be demonstrating by the social science.

According to National policy of education 1986 policy with modifications of 1992 "social science should be visualised as a vehicle to try a child to think reason, analyse and to articulate logically, it should be treated as concomitant to any subject". Past that have been tremendous development in theories of learning and teaching. Social size occupies a place of importance the researchers have been scanty.

Social science has played a predominant role not only in the advancement of civilization in general but also in the development of other subjects. Now, it has wider applications in almost all branches of knowledge. Hence, social science has been and inseparable part of school curriculum in formal education and it continues to be so. Social science is a self-contained mental discipline, with its own language and structure. It is for the training and exercise of intellectual functions. Due to its unique role in solving everyday problems it has occupied a significant position in the school curriculum. Necessity of teaching more social science in better ways has emerged from the advancement of this subject itself and its application in other disciplines. Concern for providing and appropriate social program for the vast majority of students link to the theme of "science for everyone" international level.

Review of Related Literature:

The National Curriculum Framework 2005. The concept Constructivism was emphasized in it. Constructivist Pedagogy is thought of as the creation of classroom environments, activities, and methods that are grounded in a constructivist theory of learning. with goals that focus on students developing the deep understandings in the subject matter of interest and habits of mind that aid in future learning. Cooperative Learning is one of the types of Constructivism.

Osawaru&Eravwoke (2012) The major purpose of the study done it was to determine the effects of 5E Learning Cycle as an instructional strategy on biology and chemistry on student's achievement. It was found that Learning Cycle had a significant effect on student's achievement in biology and chemistry. The result of the study includes non-significant difference in posttest scores between male and female students taught through Learning Cycle and a significant higher retention of biology and chemistry knowledge by students taught with Learning Cycle than those taught with lecture method.

Sulaiman, &Shahrill, (2015) investigated the impact of collaboration in the learning of secondary school Statistics in three government secondary schools in Brunei Darussalam. In total, 71 Year 7 students participated in this study. A series of lessons and group-based activities on Statistics were conducted that consisted of hands-on activities and application of mathematical concept to real-life problems and worksheet-based instruction. Data were collected using pre and post-tests on secondary school Statistics; a readily available 4-point student work rubrics was used as reference on collaboration that focused specifically on the level of collaboration skills acquired; and a questionnaire on students' attitudes on collaborative learning. The results from the pre- and post-tests revealed an 11.8% increase in the test scores, and 47.9% of the students worked collaboratively within their groups and shared the responsibility towards the given tasks. The responses from the questionnaire indicated that 96% of the students found working collaboratively as a group assisted them in enhancing their 47 learning of Statistics. Majority of the students also believed that they gained more knowledge and learnt specific skills and processes when they work in groups. This study has shown that collaborative learning helped to improve students' performance academically as well as to develop the necessary skills of the 21st Century.

VijayaKumari K (2007) has conducted a study on “A study to develop instructional strategies based on constructivism to teach mathematics and finding its effectiveness on the achievement of students at the elementary level." Purpose of this study was to

develop and validate instructional strategies based on cognitive and social constructivism on the achievement of elementary level students with respect to gender and type of school in mathematics. The study utilized experimental posttest only design . The instructional strategies were developed on the basis of constructivist learning environment model (CLEM), social constructivist learning environment(SCLB) and traditional learning environment (TLE) .

Operational Defination:

1. Cooperative learning technique: Cooperative learning is defined as" students working together to attain groups goals that can't be obtained by working alone or competitively" - Johnson, Johnson and Holubec, 1986.

2. Collaborative learning: A Teaching learning process designed to bring out the best from the learner by allowing them to learn from each other in a democratic situation.

3. 5 "E" learning: The five "E" is an instructional model based on the constructivist approach to learning which says that learners build or construct new ideas on top of their old ideas. The five "E" learning cycle includes 5 stages that are Engage, Explore, Explain, Expand and Evaluate.

4. Social Science: Social science is one of the core subjects which history, geography political science, economics, business studies and Commerce. taught at school level. In this study, one unit each of History, Geography and Political Science from social science syllabus of Karnataka State Government were selected for experimentation.

Study Variables For Regression Analysis

A careful review of literature was made to identify the relevant variables suitable for the present study. The selected experimental variables are described below, in order to add precision and avoid ambiguity in the study.

Independent Variables

The independent variables in the present study were

* Cooperative learning
* Collaborative learning
* 5 "E" learning

Dependent variable

Total achievement scores

i. Knowledge level sustain scores
ii. Application level achievement score

Total sustain scores

i. Knowledge level achievement scores.
ii. Application level sustain scores

Control variables

* Intelligence - operationally defined as a score on Raven's standard progressive Matrix A, B, C, D and E.
* Gender - both boys and girls of the total samples.

Multiple Liner Regression Analysis

To study the impact of independent variables on dependent variable and fit a linear equation for the relationship between the dependent variable (achievement and sustain) and independent variables (learning techniques) and other selected variables (gender and intelligence) adopted the statistical technique which helps to analyze the collected data. Result of regression analysis was used to test six null hypothesis 1, 2, 3, 4, 5 and 6. Data and result for each hypothesis are presented below tables.

Main hypothesis 1 – There is no significant impact of independent variable (Cooperative, Collaborative and 5 'E') and other select variables (gender and intelligence) on total achievement scores of total samples. Multiple linear regression analysis for total achievements is presented in the table 1

Table - 1
Result of multiple linear regression analysis for the total achievement scores of total samples.

Parameter		B	S.E	t-value	Significance
Intercept		34.963	1.994	17.534	0.000
Cooperative Leaning		5.837	2.015	2.897**	0.005
Collaborative Learning		20.822	1.979	10.520**	0.000
5 'E' Learning		-	-		
Gender	**Boys**	-3.785	2.315	-2.315*	0.023
	Girls	-			
Intelligence	**Below average**	-6.537	3.798	-3.789**	0.000
	Above average	-	-		

P<0.05 **Significant at 0.01 level * Significant at 0.05 level

It is evident from Table 1 that, 't' values for learning techniques, intelligence are significant at 0.01 level and gender at 0.05 level of significance. On the basis of these results, the null hypothesis 1 was rejected and restated as, "there is the significant impact of the independent variable (learning technique) and other selected variables (gender, intelligence) on total achievement scores. The fitted equation for the relationship between total achievement score and the independent variables which are statistically significant (as identified from table 1)

Total achievement score = 34.963+5.837(IS-Cooperative) +20.822(IS-Collaborative)-

3.785(Boys)-6.537(below-average intelligence)

Prediction for individual cases may be obtained by replacing the variables in the equation.

Main hypothesis 2 – There is no significant impact of the independent variables (Cooperative, Collaborative, and 5 'E') and other select variables (gender and intelligence) on knowledge level achievement scores of total samples.

Table - 2
Result of multiple linear regression analysis for the knowledge level achievement scores of total sample

Parameter		**B**	**S.E**	**t-vale**	**Significance**
Intercept		22.731	0.990	22.972**	0.000
Learning techniques	**Cooperative**	2.637	1.000	2.637**	0.010
	Collaborative	9.980	0.982	10.160**	0.000
	5 'E'		-		
Gender	**Boys**	-1.097	0.811	-1.352	0.180
	Girls	-			
Intelligence	**Below average**	-3.646	0.854	-4.269**	0.000
	Above average	-			

P<0.05 ** Significant at 0.01 level

The obtained 't' values for learning techniques, intelligence are significant at 0.01 level significance. The 't' values for gender are not significant. On the basis of these results, the null hypothesis 2 was restated as "there is a significant impact of learning technique, intelligence on knowledge level achievement scores. The fitted equation for the relationship between knowledge level achievement score and the independent variables which are statistically significant (as identified from table 2)

Knowledge level achievement scores = 22.731+2.637(IS-Cooperative) +9.980 (IS-Collaborative)-3.646(below avg intelligence)

Main hypothesis 3 – There is no significant impact of independent variables (Cooperative, Collaborative, and 5 'E') and other select variables (gender and intelligence) on application-level achievement scores of total samples.

Table 3
Result of multiple linear regression analysis for the knowledge level achievement scores of the total sample

Parameter		B	S.E	t-vale	Significance
Intercept		12.231	1.181	10.355**	0.000
Learning techniques	**Cooperative**	3.200	1.193	2.681**	0.009
	Collaborative	10.842	1.172	9.248**	0.000
	5 'E'	-	-		
Gender	**Boys**	-2.688	0.968	-2.775**	0.007
	Girls	-	-	-	
Intelligence	**Below average**	-2.891	1.020	-2.836**	0.006
	Above average	-			

P<0.05 ** Significant at 0.01 level * significant at 0.05 level

From table 3, it is evident that all the 't' values are significant at the 0.01 level. Hence, the null hypotheses 3 was rejected and the alternative hypothesis was accepted. This indicated that learning technique, gender, intelligence have a significant impact on application-level achievement scores. The fitted linear equation for the relationship between application-level achievement scores and the independent variable is given by:

Transfer level Achievement scores = 12.231+3.2(IS-Cooperative)+10.842(IS-Collaborative)-2.688(Boy)-2.688(below-average intelligence)

Main hypothesis 4 – There is no significant impact of the independent variable (Cooperative, Collaborative, and 5 'E') and other select variables (gender and intelligence) on total sustain scores of the total sample. Summary of the multiple linear regression analysis for total retention scores is presented in Table 4

Table 4
Result of multiple linear regression analysis for the total sustain scores of the total sample

Parameter		**B**	**S.E**	**t-vale**	**Significance**
Intercept		34.400	1.960	17.553	0.000
Learning techniques	**Cooperative**	5.688	1.980	2.873**	0.005
	Collaborative	15.522	1.945	9.521**	0.000
	5 'E'	-	-		
Gender	**Boys**	-3.874	1.607	-2.411*	0.018
	Girls	-		-	
Intelligence	**Below average**	-5.11-1	1.692	-3.021**	0.003
	Above average				

P<0.05 Significant at 0.01 level * significant at 0.05 level**

The 't' values for learning technique, intelligence is significant at 0.01 level and for gender at 0.05 level of significance. Hence the null hypothesis 4 is rejected and restated as "there is a significant impact of the independent variable (learning techniques) and another select variable (intelligence) on total retention scores. The fitted equation for the relationship between total retention scores and the independent variables which are statistically significant is given by:

Total retention score = 34.4+5.688(IS-Cooperative) +18.522(IS-Collaborative)-3.874(Boy)-5.111(below-average intelligence)

Main hypothesis 5 – There is no significant impact of the independent variable (Cooperative, Collaborative and 5 'E') and other select variables (gender and intelligence) on knowledge level sustain scores of the total sample.

Table 5
Result of multiple linear regression analysis for the knowledge level sustain scores of the total sample

Parameter		B	S.E	t-vale	Significance
Intercept		25.465	1.055	24.143	0.000
Learning techniques	**Cooperative**	2.652	1.066	2.488*	0.015
	Collaborative	6.862	1.047	6.554**	0.000
	5 'E'				
Gender	**Boys**	-2.187	0.865	-2.529**	0.013
	Girls			-	
Intelligence	**Below average**	-2.476	0.910	-2.720**	0.008
	Above average				

P<0.05 Significant at 0.01 level * significant at 0.05 level**

It is evident from table 4.43, that the 't' values of learning techniques based on Collaborative, intelligence are significant at 0.01 level of significance. 't' values of learning technique of Cooperative learning and gender are significant at 0.05 level of significance. Keeping these results in view, the null hypothesis 5 was restated as, "there is a significant impact of learning technique, gender, intelligence on knowledge level retention scores".

The fitted linear equation for the relationship between knowledge level retention scores and the independent variables which are statistically significant (as identified from table 4.43) is given by:

Knowledge level = 25.465+2.652(Cooperative)+Sustain Score
6.862(IS-Collaborative)-2.187(Boys)-2.476
(Below average intelligence)

Main hypothesis 6 – There is no significant impact of the independent variable (Cooperative, Collaborative and 5 'E') and other select variables (gender and intelligence) on application-level sustain scores of the total sample.

Table 6
Result of multiple linear regression analysis for the application level sustain scores of total sample

Parameter		B	S.E	t-vale	Significance
Intercept		8.935	1.214	7.357**	0.000
Learning techniques	**Cooperative**	3.036	1.227	2.474*	0.015
	Collaborative	11.660	1.206	9.672**	0.000
	5 'E'				
Gender	**Boys**	-1.687	0.996	-1.694	0.093
	Girls				
Intelligence	**Below average**	-2.635	1.048	-2.513	0.014
	Above average				

P<0.05 ** Significant at 0.01 level * significant at 0.05 level

The obtained 't' values of learning techniques of Collaborative learning significant at 0.01 level of significance. The 't' values of learning techniques and intelligence are significant at a 0.05 level of significance. The obtained 't' values of gender are not significant. Based on these results, the null hypotheses 6 was restated as "there exists significant impact of learning technique, intelligence on application-level sustain scores of total samples". The fitted linear equation for the relationship between application-level sustain scores and independent variables which are statistically significant (as identified from Table 6) is given by

Application level Sustain scores = 8.935+3.036(IS-Cooperative) +11.660(IS-Collaborative)- 20.635(below-average intelligence)

These results establish the validity of learning techniques based on constructivism.

Conclusion

A regression model was used to study the exact impact of the independent variables on the dependent variable. This technique was used to fit a linear equation for the relationship between the dependent variable (academic achievement) and the independent variables (cooperative, collaborative, and 5 'E') and other selected variables (gender and intelligence).

The Regression Coefficient used to interpret the change in the dependent variable, with the exchange of each category wise, maybe in the dependent variable.

This technique was also used to determine the indicator of the dependent variable and to make predictions on achievement scores of individual cases. The ease with which the coefficient estimated by regression analysis can be interpreted is the fundamental reason why this method has proved to be a powerful analytical tool, and hence it was employed in the present study.

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