International Journal of Academic Research and Development
ISSN: 2455-4197
Impact Factor: RJIF 5.22
www.academicsjournal.com
Volume 3; Issue 1; January 2018; Page No. 892-896

Effect of cooperative learning (STAD method) on Biology achievement of rural and urban students at secondary level

[1] Sangeeta Yaduvanshi, [*2] Dr. Sunita Singh
[1] Faculty of Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India
[2] Faculty of Education, Banaras Hindu University, Varanasi, Uttar Pradesh, India

Abstract
The present study examined the research question that any differences exist in school achievement among rural and urban background students with respect to instructional methods (traditional and cooperative learning strategy) used. The researcher adopted the randomized, pre-test – post-test randomised group experimental design. Total 63 students of class IX were participated in the experiment. An instrument Biology Achievement Test (BAT) was developed by researcher comprising of 100 items was used. Its reliability coefficient calculated by K20 method and Cronbach reliability formula, which were found 0.67 and 0.83 respectively. ANCOVA were used to test the hypotheses at 0.05 levels of significance. The results revealed that the structured cooperative learning strategy (STAD method) enhanced students' achievement in biology and findings were in favour of rural students. The study revealed that implementation of structured CLS can improve achievements of rural students and can be use as a tool to fill the gap between the inequality of achievements in rural and urban students in science classroom.

Keywords: rural and urban, achievement, cooperative learning, students team achievement division, science

Introduction
India is one of developing country which is well known all round the world for its scientific outputs and its effective performance in the field of IT. Enormous endeavours have been made over the last quarter century to improve science education but there is some lack of systematic fashion. Therefore, the nation is lagging in science and technology compared to developed countries (status of science education). As, recognized by NCF- 2005[8] equity issues are major problem in science education and the subject of prime concern for educationist. Science learning should be used as a tool of social change to reduce the gap of unequal divisions in the society. It should be helpful against struggle with prejudice related to, gender, caste, religion and region. Science education ought to empower students to question the social beliefs, notions and practices that perpetuate social inequality. There exist a huge disparity in science education in terms of gender, socioeconomic class, caste and region. Research studies from several countries and in the contexts of the science education reports the differential participation and low achievement of students belonging to different socio-economic regional, cultural and gender backgrounds (Baker, 1998). Academic achievement is seen as one of the main component to judge anybody's capacity and bursting potential. It also plays an important role in the development of a Nation and each and every individual. In our society, a difference can be seen in the academic achievement of children from different background. The academic achievement of children from more privilege group is found better as compared to children from other deprived group. Researchers have been carried out the studies to compare the students from rural and urban areas on a variety of social, psychological, and educational outcome variables in South Africa (Liddell, 1994; Mwamwenda, 1992) [6, 7], Nigeria (Akande, 1990) [1], Australia (NTDE, 1992) [9], India (Singh & Varma, 1995) [10], and Peru (Stevenson, Chen & Booth, 1990) [12,13]. Studies suggested that the rural-urban differences in cultural, economic, and political conditions can differ drastically from one country to another therefore it appears to be a global issue. The improvement in the academic achievement of rural student provides one important barometer for monitoring the progress of a country in public education.

Educational inequality among rural, urban and sub-urban schools is an entrenched issue in many countries. Learning of science at secondary level is very important for students of the 21st century to develop the scientific interest and participate in the economic and social development of nation. In the present scenario where the science and technology dominates most of our activities in daily life, the traditional pedagogical practices for teaching science in Indian classroom are not very effective. There are very much gap in the academic results of rural and urban students. Rural students are lagging far behind than their urban peers. To overcome thses issues, the government policies try to enhance the qualities of rural teachers' by raising their qualification and professional development. Unfortunately, these policies are not implemented appropriately and hence obstruct to improve teachers' instructional aptitudes. Therefore the lack of quality teacher and resources also imparts a very crucial role in the academic achievement of rural students (Wang et al., 2016) [14]. To address the problem related to equity issues either concern with educating the marginalized group or enhancement of academic performance rural students in

science, teachers require doing strenuous effort. A synthesis of research on cooperative learning reports that CLS improve the achievement of students and their interpersonal relationships. After reviewing 67 studies of the achievement effects of cooperative learning, Slavin (1991) [11,12] found that the 61% study shows significantly greater achievement in cooperative learning groups over the traditionally taught control groups. These positive effects were found in all major subjects, all grade levels, in urban, rural, and suburban schools, and for high, average, and low achievers. There are very few studies carried out on implementation of cooperative learning in rural schools to enhance academic performances of students in science subjects. As, Hossain. A. and Tarmizi, R. A. (2012) [4] conducted a study and revealed that implementation of cooperative learning enhances students' performance in mathematics and attitudes towards mathematics. Similarly, Haliru, U. (2015) [3] conducted study to investigate the effect of cooperative learning strategy on geography students' academic performance in senior secondary schools in Sokoto State, Nigeria. Findings of the study revealed that there is significant difference between the academic performance of students taught Geography using Cooperative Learning Strategy and those taught using traditional lecture method and also reports a significant difference in the academic performance of urban and rural students when exposed to cooperative learning strategy in favour of urban students.

More so, there is dearth of study in Indian context on cooperative learning that examine the influence of locality of students' on their achievement in biology. The study therefore investigates the effect of structured CLS on students' achievement in biology to answer the following research questions:

Does structured CLS have any impact on Biology subject achievement of secondary students' in relation to their locality?

Objectives

Keeping in the view of above research question following objective was framed:

1. To find out the effect of structured CL strategy (STAD) on students' achievement in biology with respect to area of residence of the students.

Materials and Methods

For the present study the investigator adopted the 'pre test – post test randomised group design.' In this study the investigator adopted 'randomized group' technique for equating the groups. The students were randomly divided into two groups.

R	O1	X	O2
R	O3	C	O4

Where,

R - Random Selection

O1, O3 – Pre-test Scores, and O2, O4 – Post-test Scores

X – Experimental Group, C – Control Group

Population

All IX standard students of Varanasi city constituted the population of the present study.

Sample and Sampling Technique

For the present study purposive method of sampling was used by the investigator for the selection of school that must fulfil the objectives of study and convenient for the investigator. Subjects were randomly assigned into control and experimental groups. Both groups had been equivated on the basis of their pre test scores.

Instrumentation

To fulfil the objectives of the present study the following four instruments were constructed by the researcher and used to collect the relevant data,

BAT: The data collecting instrument was named as Biology Achievement Test (BAT) developed by researcher herself. BAT is consisting of 100 items and validated by experts of test and measurement and three experienced biology teacher for face and content validity. The reliability coefficient of test was calculated by using Kuder-Richardson formula 20 and Cronbach coefficient (split half method of reliability) method, the values were found 0.67 and 0.838 respectively.

Layout Plans on Structured CLS (STAD model) The layout plans deals with the theme of organization in living world and cover four units of Class IX NCERT (National Council of Education Research and Training) science textbook include units; Cell: The fundamental unit of life, Tissue, Diversity in Living Organisms, Why do we fall ill? The plans included instructional objectives, a list of materials needed, group size, assignment to roles, and arrangement of the room.

Worksheet Based on the Four Units of Biology: It is designed according to the objectives of layout plans for STAD Method of structured CLS as described above.

Opinionnaire: To assess the perception of students' for cooperative learning: A questionnaire of 15 items was prepared by the researcher to assess the perception and feedback of students towards cooperative learning.

Participants: The total 63 students of class ninth were participated in the study. They were randomly divided into two groups, out of which 32 students comprised the experimental group and 31 students in the control group. One group called as experimental group which is taught by the structured cooperative learning i.e. student team-achievement division (STAD method) and the other group called as control group is taught by traditional lecture cum demonstration method.

Treatment

For systematic implementation of STAD in the classroom by researcher developed systematic layout plans and worksheets. All students were divided into four members of mixed ability (1- high achiever, 2 - average achiever and 1- low achiever) and assigned definite role. The teacher will give a brief concept about content and focused the attention of students on the important points of learning. Then provide a single

worksheet to each group and instruct them to fill and complete it cooperatively after discussion with each-other. While students are working in groups, the teacher move to each group to observe the activities of students provide motivation, guidance and also help them to resolve the conflict if arises. Here, during her visit to the different group teacher also assess the learning outcome of students. Students earn team points based on how well they scored on the quiz compared to past performance. Individual as well as a good group performance both were considered for final assessment. The team had highest score was declared as winning team and the title of "biology Star' was given to them.

Data Collection

Pre-test and Post-test scores on BAT, responses of students on opinionnaire regarding their perception towards CLS and introspection report of students were collected.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics -20 Software for the t-test followed by one-way analysis of co-variance (ANCOVA). All values were expressed as mean (±SE). P value < 0.05 was considered significant in the present study.

Results

Effect of Structured CLS (STAD) on Achievement of in Biology Subject in Relation to Locality of Students

At the time of starting the experiment, investigator equivalent both the experimental and control group on the basis of their achievement score at pre test level although pre test score showed no significant difference rather there exist many variable that may affect results of depended variable. Therefore, to control these error variance, ANCOVA studies were carried out to minimize or rectified the unmatched group at the pre test level. The use of ANCOVA nullify the difference of pre-test by adjusting scores at post test level that increases the statistical cal power of the test.

No significant difference was found in achievement scores of rural and urban in present study since, $F_{(1,62)}= 0.714$, p= 0.402; p>0.05. Further the achievement of rural students was found slightly higher as compared to urban students as observed in the estimated marginal means table after correction at the pre-test level. The interaction effect of group with locality shows $F_{(1,62)}= 0.144$, p= 0.706; p>0. 05 indicate that CLS had no significant effect with respect to locality of students.

ANCOVA analysis to find out the effect STAD on students' achievement with respect to their locality has been represented in the following table from Table 2-4.

Table 2: Descriptive Statistics

Group	Area of Residence	Mean	Std. Deviation	N
Experiment	Rural	65.31	9.970	13
	Urban	58.00	12.396	19
	Total	60.97	11.874	32
Control	Rural	47.46	13.974	13
	Urban	51.44	11.728	18
	Total	49.77	12.651	31
Total	Rural	56.38	14.975	26
	Urban	54.81	12.362	37
	Total	55.46	13.408	63

Table 3: Tests of between-subjects effects

Dependent Variable: Post Total Test					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	9930.885[a]	4	2482.721	118.540	.000
Intercept	1518.648	1	1518.648	72.509	.000
Pre_Total	7425.679	1	7425.679	354.545	.000
Group	1385.868	1	1385.868	66.169	.000
Locality	14.949	1	14.949	.714	.402
Group * Locality	3.020	1	3.020	.144	.706
Error	1214.766	58	20.944		
Total	204924.000	63			
Corrected Total	11145.651	62			
a. R Squared = .891 (Adjusted R Squared = .883)					

Table 4: Estimated Marginal Means - 4a. Group, 4b. Locality, 4c. Group* Locality

4a. Group				
Group	**Mean**	**Std. Error**	**95% Confidence Interval**	
			Lower Bound	**Upper Bound**
Experiment	60.271[a]	.827	58.616	61.927
Control	50.677[a]	.835	49.005	52.349

a. Covariates appearing in the model are evaluated at the following values: Pre Total Score Test = 18.22.

Table 4b: Area of Residence (Locality)

Area of residence	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Rural	55.969[a]	.898	54.172	57.766
Urban	54.979[a]	.753	53.472	56.486

a. Covariates appearing in the model are evaluated at the following values: Pre Total Score Test = 18.22.

Table 4c; Group * Area of Residence

Group	Area of Residence	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experiment	Rural	60.995[a]	1.290	58.413	63.577
	Urban	59.548[a]	1.053	57.440	61.656
Control	Rural	50.944[a]	1.283	48.376	53.511
	Urban	50.410[a]	1.080	48.248	52.572

a. Covariates appearing in the model are evaluated at the following values: Pre Total Score Test = 18.22.

Discussion

Equity in science education is prime concern for Indian educationist now a day. There are many disparities in accessibility and availability of science education in terms of gender, social class and locality. Although, locality or rural-urban disparity is due to less infrastructural facilities, trained teacher availability in school of rural areas (NCF-2005) [8]. The well-known challenges in science education today include overcrowded class size, lack of fund and student interest. To overcome this situation it is essential to have strong effective policies and use of effective pedagogy by science teachers. The traditional practices followed in Indian science classroom seldom address these kinds of issues. In cooperative learning situation, the students learn in small heterogeneous groups, all group members have their definite role and they all participate fully in cooperative learning activities; interact with each other and the boring science lessons become interesting to them. In an experimental study Lau, Kwong, Chong and Wong (2014) [5] found CLS improve the students` teamwork skills. The study also, indicated that students were willingness to help out other team members to achieve a common goal. Group members are positively inter-dependent on each other to achieve common learning goal and there is face to face promotive interaction among them each member encourage the learning of other member positively. Thus, these components of cooperative learning strongly promote cultural parity to fill the gap in between rural and urban students.

This study revealed that structured CLS significantly enhance achievement of rural as well as urban students in comparison to control group. The mean gains are a little in favour of rural students that indicates achievement of rural students considerably enhances within both methods CLS. The results are similar with the finds of Slavin and Oickle's (1981)[11,12] and Hossain & Tarmizi (2012)[4]. The findings of present study is contras with the result of Haliru, (2015)[3] who, reports a significant difference in the academic performance of urban and rural students when exposed to Cooperative Learning Strategy in favour of urban students.

Thus, this study shows that cooperative learning strategy has a positive effect on every student's achievement irrespective of their locality. Researchers also observed that during cooperative learning classes, students enjoy group discussions the urban students who at the commencement of treatment refused to work with low achiever rural students at the end of the experiment they become friends. Responses of the students on the questionnaire regarding their perception on cooperative learning revealed that students mentioned that they enjoy such type of teamwork, group discussions and group debates and also got a good opportunity for expressing their opinions and develop more friendly relation with their classmates. The feedback from the students was very much encouraging, they said the teaching of biology is interesting and joyful experience for them, they also want to learn chemistry and physic in a cooperative learning environment. Besides, thus it was also observed that this CLS is also helpful to develop students' social and communication skills, increase tolerance and acceptance of diversity therefore, filling the gap of locality.

Conclusion

Present education system need to use CLS in their classroom and teacher should encourage to use CL in classroom because these strategies ensures active participation of students in their knowledge construction process and to develop interest in respective subject and make teaching effective. Structured CLS (STAD method) improve achievement of rural students, but it has no significant relation with respect to locality of students. So, it can be concluded that these instructional strategies contribute towards realization of cultural equity in science classrooms in Indian context.

References

1. Akande, A. Influences of urban-rural upbringing on Nigerian students' test anxiety. Psychological Reports, 67, 1261-1262.
2. Baker, D.R. (1998). Equity issues in science education. In: Fraser BJ, Tobin KG. International Handbook of Science Education. London: Kluwer Academic Publications; 1990; p. 869-95.
3. Haliru, U. Effect of cooperative learning strategy on geography students' academic performance in senior secondary schools in Sokoto State, Nigeria. M.Ed. Thesis in Curriculum and Instruction, Zaria: Ahmadu Bello University. Retrieved from http://hdl.handle.net/123456789/7283
4. Hossain, A., Tarmizi, R.A. (2012). Effects of cooperative learning on students' achievement and attitudes in secondary mathematics. 3rd World Conference on Learning, Teaching and Educational Leadership (WCLTA-2012). Proc Soc Behav Sci, 2015; 93:473-477.
5. Lau, P., Kwong, T., Chong, K., Wong, E. Developing students' teamwork skills in a cooperative learning project. Int J Lesson Learn Stud, 2014; 3:80-99.
6. Liddell, C. South African children in the year before school: Towards a predictive model of everyday behaviour. International Journal of Psychology, 1994; 29, 409-430.
7. Mwamwenda, TS. Cognitive development in African children. Genetic, Social, and General Psychology Monographs, 1992; 118, 5-72.
8. National Curriculum Framework (NCF). Position Paper National Focus Group on Teaching of Science. New Delhi, India: National Council of Educational Research and Training (NCERT); 2005.
9. NTDE. Results of the Primary Assessment Program for 1991 in urban and non-urban schools. Curriculum and assessment research and evaluation report. Darwin, Australia. Northern Territory Department of Education

(ERIC Document Reproduction Service No. ED 360320). 1992.
10. Singh, R., Varma, SK. The effect of academic aspiration and intelligence on scholastic success of XI graders. Indian Journal of Psychometry and Education, 1995; 26,43-48.
11. Slavin, RE, Oickle, E. Effects of cooperative learning teams on student achievement and race relations: Treatment by race interactions. Sociology of Education, 1981; 54(3), 174-180.
12. Slavin Robert E. Synthesis of Research on Cooperative Learning. Educational Leadership, 1991; 48: 71-82. EJ 421.
13. Stevenson, HW. Chen, C. Booth, J. Influence of schooling and urban-rural residence on gender differences in cognitive abilities and academic achievement. Sex Roles, 1990; 23, 535-551.
14. Wang, D. Li, L. Wang, J. Li, H. The rural-urban gap in teachers' collaborative learning in China. The 60th Annual Conference of Comparative and International Education Society (CIES), Vancouver, Canada, 2016; 6–10. http://hdl.handle.net/10722/226525.