USING COOPERATIVE LEARNING IN TEACHING TOPOGRAPHICAL MAP IN GEOGRAPHY TO ENHANCE LEARNING ACHIEVEMENT OF 10TH GRADE STUDENTS IN BHUTAN

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ABSTRACT

The purposes of this study were 1) to compare the students learning achievement in topographical map reading before and after using cooperative learning approach, 2) to find out the students' learning satisfaction in using cooperative learning in geography subject and 3) to study the change in learners' behavior as a result of using cooperative learning. The research was mixed mode research. Clustered random sampling method was used to select two sections (64 students) of grade ten students as research participants. The research instruments used for data collection were achievement test, students' satisfaction questionnaire and teacher's journal on students' learning behavior observation.

The quantitative data collected from learning achievement test and questionnaire were interpreted using inferential statistics t-test with $p< 0.05$ level of significance, mean and standard deviation. The qualitative data was analyzed using the coding system (open, axial and selective) which were collected from teachers reflective journal on students' learning behavior observation .The study was carried out for four consecutive weeks. The findings revealed that the use of cooperative learning method enhanced learning achievement, there was higher level of satisfaction and it was determined that the learning behavior of the experimental group had changed positively. Many studies have been already carried out using cooperative learning method in different subject using varied samples and in different regions of the world. Researcher has more interest in conducting research using the same method, because so far no one in Bhutan has studied in geography subject particularly in teaching topographical map**.** This study would be useful for geography teachers in Bhutan to improve their teaching strategy.

Keywords: Cooperative learning, Learning achievement, Satisfaction, Topographical Map, Geography, Grade Ten.

1. Introduction

The word 'geography' was first used by the Greek scholar Eratosthenes in the third century B.C. According to Saini (2009, p.3) the literal meaning of geography is to describe about the earth's surface. "Geography is unique in bridging the social science (human geography) with natural science (physical geography).Human geography concerns the understanding of the dynamic cultures, societies and economies**,** and physical geography concerns understanding of the dynamic of physical landscape and the environment" (Penjor 2014, p.25). Students'

involvement in the lesson is very important where they learn better through active participation than through passive listener to monotonous lecturing (DCRD, 2014).

One important aspect of physical geography which is compulsory for all secondary school geography subject is map reading. Different types of maps used in teaching and learning geography include topographical map, atlas map, plan map, sketch map among other. Falode et al. (2016), found that map is a representation of earth's surface on a 2-dimensional surface. The ability of students to recognize conventional signs on a map and interpret what those signs represent is known as map reading. Map skills in Geography do not develop spontaneously. Unfortunately the traditional teaching method based on rote learning and poor planning still dominate our lecture rooms. The classical method, in which "telling" predominates and the learner is a passive listener, is ineffective for map work. This seemed to have lessened the interest and achievement of students in this aspect of geography.

Tshibalo (1998) states that learners are deprived of opportunities to interact with the educator and demonstrate what they know. Cooperative learning is an approach to group work that minimizes the occurrence of those unpleasant situations and maximizes the learning and satisfaction that result from working on a high-performance team. Currently, cooperative learning is used in schools and universities worldwide for different topics and for all age groups (Mohammadjani & Tonkaboni, 2015). In all levels of education students in cooperative situations achieved greater academic benefits as the learners swim together. Tshibalo (1998) asserts that "Co-operative learning in the teaching of map work may promote student motivation, build group skills, and foster social and academic interaction among students and reward successful group participation. Low achievers can feel successful by making positive contributions to the group".

Geography subjects in Bhutanese curriculum were mostly delivered through traditional methods where the learners encountered difficulty in understanding the concepts. Despite the effort used by the teachers in teaching geography subject students' performance are unsatisfactory. Deteriorating quality of education in Bhutan had been a major concern. According to Bhutan Higher Secondary School Education Certificate (BHSEC) in 2014, only 4.06% of students could score marks in the range of 80 to 100. Whereas in the same mark range; 16.98% of students scored in math, 8.31% of students scored in chemistry, and 11.54% of students score in business math (BCSEA, 2015). Poor performance in geography in Bhutan Council for Secondary Examination (BCSE) has been a major concern of many geography teachers in Bhutan. As per the resolution made on 17th annual education conference (25-31December 2014), Royal Education Council (REC) has initiated to conduct nationwide workshop on Kagans Cooperative Learning structures "Transformative Pedagogy for 21st Century Learning" to all the teachers.

Many studies have been already carried out using cooperative learning method in different subject using varied samples and in different regions of the world. Ahmad (2010) recommended future studies to be conducted to investigate the comparative effectiveness of cooperative learning method at different levels of education. Despite its popularity no research has been carried on the use of cooperative learning in geography subject particularly in teaching topographical map in Bhutan. In this regard purpose of this study is designed to investigate the effect of

cooperative learning method on learning achievement and students satisfaction towards learning geography topographical map in a secondary school in Bhutan. Further, the study focused on the behavior change of learners when incorporating cooperative learning.

2. Objectives of the study

1 To compare the students learning achievement in topographical map reading before and after using cooperative learning approach.

2 To find out the students' learning satisfaction in using cooperative learning in geography subject.

3 To study the change in learners behavior as a result of using cooperative learning.

3. Materials and methods

3.1 Research Design

Mixed mode (quantitative and qualitative) research methodology was used to conduct this study. According to Johnson and Onwuegbuzie (2004) mixed method research is defined as the class of research where the researchers mixes or combines quantitative and qualitative research technique, methods, approaches, concepts or languages into single study. Further Johnson, Onwuegbuzie and Turner (2007) states that mixed methods research paradigm offers an important approach for generating important research questions and providing warranted answers to those questions. They suggests that mixed method research are likely to provide superior research finding and outcomes.

3.2 Sampling

Clustered random sampling method was adopted to select samples. The researcher used two sections of 64 grade 10 students, one was the experimental group and the other the control group. There were 32 students in each group. The scores of the pre-test were used to find out if the groups were equal in ability. The experimental group was taught using cooperative learning method while control group was taught using traditional method.

3.3 Research Instruments

The following research instruments were used for collecting different data:

Achievement Test: To respond to the first objective, the achievement test consisting 30 multiple-choice questions were administered for the pre-test and post-test in both experimental and control groups.

Satisfaction Questionnaire: To respond to the second objective, the researcher used questionnaires. The questionnaires consisted two parts. In part A, the researcher asked the demographic information of the participants. Part B consisted of 20 items/questions using five point Likert scale towards topographical map reading in geography subject. It was administered to experimental group by the end of the experiment.

Teacher's reflective journal on students' learning Behavior Observation: To respond to third objective teacher maintained 3 reflective journals based on the learning behavior observation made during the intervention of cooperative learning method in experimental group. It was maintained in the 1st, 3rd and 4th week of the study. Observation was made with special focus on the learning behavior besides achievement of learners.

3.4 Research Procedures

Firstly, a pre-test was conducted for both the experimental and control groups. However, the questionnaire was administered only to the experimental group in order to study the level of satisfaction towards learning topographical map reading in geography subject after using cooperative learning method. The researcher used cooperative learning method in experimental group while the control group was taught by traditional method. In the process of treatment, the researcher observed the learning behavior of learners and maintained reflective journal based on the observation made. Towards the end of the study, researcher conducted post-test in both the groups and distributed satisfaction questionnaires to the experimental group.

3.5 Data Analysis

3.5.1Test Scores

The scores from the pretest and posttest were calculated for the mean and standard deviation. A comparative statistical analysis using paired sample t-test was done within the group i.e. analysis of pretest and posttest of experimental group as well as control group. The comparison between pretests and posttests scores of the two groups was done by conducting independent t-test. The value of 2-tailed significance value (P) was referred to determine the significance difference between the means.

3.5.2 Questionnaire

The data was analyzed to study the learning satisfaction of the learners after incorporating cooperative learning in geography subject. The data was collected though questionnaire distribution at the end of the treatment to experimental group. For the data analysis mean and standard deviation for all 20 items were computed and presented graphically.

3.5.3 Teachers reflective journal on learning behavior observation

To analyze the qualitative data coding system (open. axial and selective) of the grounded theory (Corbin &Strauss, 2008) was used. The overall data was organized and interpreted under five core themes.

4. Results

4.1Analysis of Test Score

The pre-test and post-test scores of each group were compared. Table 1 shows the comparison of the pre and post-test within the group.

Table 1. Comparison of the pre-test and post-test within the group

Group	Test	Mean	Mean Difference	Standard Deviation	Sig(2-tailed)
Control	Pre-test	13.03	19.81-13.03=6.78	3.35	0.000
	Post-test	19.81		3.17	
Experimental	Pre-test	14.06	23.59-14.06=9.53	2.67	0.000
	Post-test	23.59		2.53	

Significance level (p) :< 0.05-Significant

The scores of pretest and posttest were compared in terms of mean, standard deviation and significance value(p).The mean of the pretest and posttest of control group were 13.03 and 19.81 respectively with the mean difference of 6.78.Similarly the mean of pretest and posttest of experimental group were 14.06 and 23.59 respectively with the mean difference of 9.53.The significance value for both the groups were 0.00 which indicates that, there was statistically significant increase in the scores of the students in the posttest as compared to that of the pretest in both the groups

4.2 Pretest and Posttest comparison between the groups

Table 2. Comparison of pretest and posttest between the groups i.e. control and experimental group.

Group	Test	Mean	Mean Difference	Standard Deviation	Sig (2-tailed)
Control	Pre-test	13.03	14.06– 13.03= 1.03	3.35	0.177
Experimental		14.06		2.67	
Control	Post-test	19.81	23.59 – 19.81 = 3.78	3.17	0.000
Experimental		23.59		2.53	

The mean difference of the pretests of experimental and the control group was 1.03 as shown in table 2.The significance value(p) of pretest was 0.177 which indicated that the scores in the pretest of both the groups were not significant statistically. Thus the learning ability of both the groups were equal in the beginning of the experiment.

The mean difference of the posttest of the experimental and the control group was 3.78 as shown in the table 2.The significance value(p) of the posttest was 0.000 which indicated that the scores in the posttest of both the groups were significant statistically. It means that the scores of the posttest of experimental groups is much higher that the scores of posttest of the control group. Thus the experimental group has performed better than the control group as the participants underwent treatment

4.3 Questionnaire

To respond to the second question mean and standard deviation were computed for all the statements. The result was presented in table 3.

Table 3. Mean and Standard Deviation of students' satisfaction questionnaire

Sl. No	Statement	Mean	S.D	Level of Satisfaction
1	I am satisfied with what I learn in map reading.	4.88	0.336	Strongly Agree
2	I would like to improve my map reading skills.	4.84	0.369	Strongly Agree
3	All the students get to learn when we work in group.	4.81	0.397	Strongly Agree
4	I was able to contribute in the group activities.	4.72	0.457	Strongly Agree
5	I am confident that I can interpret map easily in real life situation.	4.44	0.669	Strongly Agree
6	I like to learn more about topographical map reading.	4.81	0.471	Strongly Agree
7	All group members got equal opportunity to participate.	4.66	0.827	Strongly Agree
8	I look forward for geography classes.	4.47	0.621	Strongly Agree
9	All activities were carried out effectively.	4.84	0.369	Strongly Agree
10	All activities were relevant to the content.	4.75	0.440	Strongly Agree
11	I feel motivated when taught with different cooperative learning structures.	4.69	0.471	Strongly Agree
12	I like to participate more when lesson is taught using cooperative learning method.	4.91	0.296	Strongly Agree
13	Map reading concept is understood easier when I am involved in discussion.	4.72	0.523	Strongly Agree
14	I am confident I will do well in geography map reading.	4.59	0.560	Strongly Agree
15	All activities were carried out on time.	4.88	0.336	Strongly Agree
16	Topographical map reading is interesting when taught using cooperative learning method.	4.59	0.615	Strongly Agree
17	It was hand on experience lesson.	4.94	0.354	Strongly Agree
18	I agree that cooperative learning method makes geography map reading more enjoyable.	4.94	0.246	Strongly Agree
19	Teacher was there to guide us throughout the lesson.	4.91	0.296	Strongly Agree
20	Overall I am satisfied with the cooperative learning method used in teaching topographical map reading.	4.78	0.553	Strongly Agree
	Sub total	**4.76**	**0.46**	**Strongly Agree**

Note: Level of satisfaction on individual items in the questionnaire: (0.00-1.00) =Strongly Disagree, (1.10-2.00)= Disagree, (2.10-3.00)=Neutral (3.10-4.00-Agree) and (4.10-5.00)= Strongly Agree.

From the above table the researcher concluded that almost all the students strongly agreed that their level of satisfaction was higher while they were taught topographical map reading using cooperative learning method. The highest mean of 4.94 was rated by the participants for two statements with their standard deviation of 0.354 and 0,246 and the lowest mean of 4.44 was rated for one statement with standard deviation of 0.669.The overall mean was 4.76 and standard deviation was 0.46.Therefore the data analysis indicates that the students experienced high level of satisfaction when the cooperative learning method was integrated in teaching and learning topographical map reading in geography.

4.4 The result of Teachers Reflective Journal on Students Learning Behavior Observation

Data obtained through teachers reflective journal were analyzed using coding system(open, axial and selective)based on the grounded theory of Corbin and Strauss (2008).The overall data was organized and interpreted in five core themes: 1) Classroom participation, 2) Task accomplishment on time, 3)Group interaction, 4) Development of Cooperative skills and 5) Enjoyment in learning.

4.4.1 Classroom Participation

The observation record used for learners behavior change revealed that learner's behavior improved over a period of time when they were taught using cooperative learning method. Learner's participated better each time they were kept in group to carry out the assigned task.Over a period of time learners behavior in participating to carry out the task has improved while using cooperative learning method. They were more interested to carry out the activities in group. They got to work in team and learn more.

4.4.2 Task Accomplishment on Time

Incorporating cooperative learning helped learners to complete the assigned task on time. Most of the task were focused in developing positive relation among the leaners so they helped each other and finally they were able to achieve better ideas and information within given time period. They knew the importance of time while working in group. Learners respected each other's valuable time and tried to use it more effectively. They were able to complete their task on time therefore researcher concluded that learner's time management behavior changed when they worked in group.

4.4.3 Group interaction

One of the important component to make cooperative learning more effective is interaction. So one area researchers focused during the behavior observation period was group interaction. Cooperative learning method has allowed learners to know more from their friends through positive interaction. They listened to and shared their views and resources for better group performances.

4.4.4 Development of cooperative skills

The observation record maintained in teacher's journal also mentions about learners developing cooperative skill over period of time. It means learners were able help each other through trust and they could

complete task more effectively. Learners' behavior has improved in terms of trust and conflict management and were able to carry out the task more effectively.

4.4.5 Enjoyment in Learning

Cooperative learning method has created enjoyments in learning the lesson. They were kept in small group where level of enjoyment in learning has improved over a period of time as per the record maintained in learner's behavior change observation sheet. They enjoyed learning when cooperative learning method was used in teaching and learning the lesson. Observation record revealed that the lesson was more fun as they were learning from each other more effectively.

5. Discussion

The study has three major findings. The first was that the cooperative learning method has enhanced learning achievement of experimental group than the control group after treatment, second finding was that the level of satisfaction of experimental group was higher towards using cooperative learning method in learning topographical map reading and final finding was that besides learning achievement cooperative learning method also brought positive change in learners behavior.

5.1 Learning Achievement Test

The finding showed that the mean score of pretest were 13.03m and 14.06 for control group and experimental group respectively which was below average. But the mean score of posttest were 19.81 and 23.59 for control and experimental group which was above average. However the experimental group exhibited higher mean score in posttest. This indicated that cooperative learning method enhanced learning achievement of learner compared to traditional method. This finding is parallel to the studies carried out by: Altun et.al. (2014); Asha (2016); Chatila & Hussieny (2017); Rabgay (2012); Namgyal (2014); Tran (2014); and Tshibalo (2003). All their findings showed that there was a significant improvement in students learning achievement with the use of cooperative learning method. Such findings prove that leaners perform better when taught with cooperative learning method than they did with traditional method.

The possible reasons to account for high test score in posttest by the experimental group could be because students were allowed to work in pairs or groups throughout the study. Therefore Dale's (1946) learning theory supports the findings. According to Dale's cone of learning theory, the rates were highest with teamwork which included group discussion 50%, practice by doing 75% and teaching others 90%.Further the finding of the study, that cooperative learning increases students learning achievement, is supported by the theory of constructivism. Students were actively involved in knowledge construction rather than being a passive listener. Cooperative learning method encouraged learner's to involve actively, share their ideas and provide feedbacks which helped them construct knowledge on their own while teacher plays the role of facilitator.

5.2 Students satisfaction in using cooperative learning method

To examine the second objective, 20 items which intended to find learning satisfaction in the experimental groups towards using cooperative learning in geography topographical map reading lesson. The questionnaire used a five point Lakers scale extending from 5(strongly agree) to 1(strongly disagree).The data analysis revealed higher level of learning satisfaction when cooperative learning method was incorporated in teaching topographical map reading in geography.

This finding was in line with the study carried out by; Mohammadjani and Tonkaboni (2015) who examined a comparison between the effect of cooperative learning teaching method and lecture method on students learning satisfaction level. The result showed that the cooperative learning teaching method has a higher effect on students learning than the lecture teaching method. Also the result showed that the cooperative learning method results in higher satisfaction in students than the lecture teaching method.

Some possible reasons for their increase in satisfaction level were due to enjoyable learning environment where they had the freedom to interact, share their ideas and views, receive and give support to each other. Positive feedback received from friends and teacher has motivated learners to contribute more for their group's success. Another reason for higher level of satisfaction was because of the equal opportunities provided for each members for the success of cooperative learning. Members in cooperative learning group worked together on a common task, in "sink and swim together" spirit which developed positive interdependence (Johnson & Johnson, 2009).Another reason for learners' satisfaction could be due to more freedom in learning that led them to understand the concept more clearly in simpler way.

5. 3 Teachers reflective journal on students learning behavior observation

The final objective of the study was to study the change in learners, behavior as a result of using cooperative learning. It was examined because cooperative learning method not only enhance learning achievement but also build cooperative skill among the learners. Researcher used students' behavior observation sheet to write reflective journal. Students learning behavior observation was done three times (beginning, middle and last class) and maintained teacher's journal for the same.

Findings from the study supported Aydin (2013) who concluded that the student's interest and participation in the course were increased, their social aspects were improved, the lectures were entertaining and there was positive atmosphere in the classroom. Students came to class with preparations, they used various resources while preparing a presentation, they carried out their individual responsibilities in the group work and they did their best for the sake of the groups success after using cooperative learning method. Similarly, Altun et al. (2014) also found that cooperative learning environment provided cooperation, supported permanent learning, provided opportunities to be successful, and contributed to the development of social and personal skill which stands in line with the findings of Tshibalo (2003) that there is significant correlation between attitude towards cooperative learning and intergroup relation, social support and psychological health. According to Altun et al. (2014) the purpose of education is not

only teaching knowledge but also improving student's social skills. In cooperative learning process students are likely to improve their problem solving, communication, decision making, time management silks.

Thus the researcher concluded that cooperative learning method is effective to enhance learning achievement, improve level of satisfaction and change learning behavior of learners positively.

6. Conclusion

6.1 The Result of Test Score Analysis

The first objective of the study was to compare the learning achievement of the 10th grade students in topographical map reading after using cooperative learning method. Pretest and posttest was administered to both experimental and control group to determine the differences in geography learning achievement, both before and after using cooperative learning method and traditional method to respective group.

A comparative statistical analysis using paired sample t-test was done within the group. The mean of the pretest and posttest of the experimental group were 14.06 and 23.59 respectively. The mean of pretest and posttest of the control group were 13.03 and 19.81 respectively as shown in table 4.2.The mean difference of experimental group was 9.53 while the mean difference of control group was 6.78.The significance value (p) was 0.00 which indicated that there was statistically significant increase in the scores of posttest than that of pretest of both the groups. Thus, this accepted the hypothesis 1(H1) which stated that the learning achievement of experimental group will be better than the control group after using cooperative learning pedagogy in topographical map reading.

A comparative statistical analysis using independent t-test between the experimental and control group were computed. The mean difference of the posttest of the experimental group and control group was 3.78 as shown in the table 4.3.The significant value (p) of the posttest was 0.00 which indicated that the experimental group scores in the posttest was statistically significant. It means that the scores of the posttest of experimental group is much higher than the scores of posttest of the control group.

Thus the result of the mean, standard deviation and significance value computed using paired sample t-test and independent t-test indicates that there was significant gain in test scores of experimental group as a result of inclusion of cooperative learning method.

6.2 The Result of the Students' Satisfaction Questionnaire

The second objective of the study was to find out the students' learning satisfaction in using cooperative learning in geography subject. To answer this objective, researcher administered 20 itemed satisfaction questionnaires to the students in the experimental group at the end of the treatment. Students' responses to each item showed that their level of satisfaction towards learning geography has increased after using cooperative learning method. The highest and lowest mean score were 4.94 and 4.47 respectively with the average mean score of 4.76 as shown in table 4.3, which indicates that students strongly agreed with the statements and could see increase in their level of

satisfaction towards learning geography. Thus it accepts the hypothesis 2(H2) which stated that there will be higher satisfaction in learners' towards geography after using cooperative learning.

6.3 The result of Teachers Reflective Journal on Students Learning Behavior Observation

The purpose of the students learning behavior observation and maintaining a teacher's reflective journal was to find out whether cooperative learning method brings positive change in learners behavior besides learning achievement after using cooperative learning method. The data collected was analyzed using the coding system (open, axial and selective) of grounded theory (Corbin &Strauss, 2008).

Students were observed to be participating actively and more frequently once they get familiar to their group members. With positive feedback from friends and teacher students get motivated and participates more compared to first class. Over a period of time learners were able to accomplish the task assigned after time (first class), on time (mid-class) and before time (last class). Every member in the group carried out their responsibilities and interacted better with each activities being carried out. For groups success cooperative skills were developed among the members. Students shared their ideas and resources for their group's success which ultimately brought more enjoyment in learning. Thus the study concluded that the learning behavior of experimental group students changed positively besides learning achievement after using cooperative learning accepting the third hypothesis (H3) that the learning behavior of learners will change positively after cooperative learning intervention.

6.4 Recommendation

6.4.1Recommendation for Practice

The study found out that cooperative learning method enhanced learning achievement, increased level of satisfaction and changed students learning behavior in topographical map reading in geography subject .Therefore cooperative learning method is an approach where every individual learners get involved and is applicable to all subjects. The following recommendations have been made based on the findings of the study with the hope it can be of great help to the geography teachers.

1) The use of cooperative learning should be encouraged during teaching and learning of geography in schools since it enhanced the learning achievement, improved level of satisfaction and learning behavior of students.

2) Teachers may also try to teach other topics in geography using cooperative learning method besides topographical map reading.

3) This study would serve as a references for the future researcher who carries out research in similar field.

6.4.2 Recommendation for future research

1) This study was limited to 64 grade 10 students in two classes. For further study, similar research can be conducted for different grade levels and sample size.

2) Future research need to be carried out over longer period to make the study result more reliable and significant.

3) This study has used four cooperative learning approaches, Team Jigsaw, Think Pair Solo, Round Table and Team Investigation. Researches may be conducted to study the effectiveness of each of these approaches in various subjects.

4) For authentic result, the researcher can accompany his/her teacher colleague to observe the students learning behavior and maintain reflective journal unlike in this study where the researcher observed and maintained the journal.

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