Collaborative Learning Practices by Gender: A Case of a Community School in Nepal

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Abstract

This study explores the situation of basic level community school boy and girl students' science and health learning through collaborative culture. Fifth, sixth and seventh-grade students (both boys and girls) took part in this study. As per the aim of this study, a set of questionnaire was developed and administered to the sampled students. Two hundred and fifty-eight students were selected from the sampled school using the census sampling technique. All the students were involved in collaborative learning activities such as building trust and open communication, establishing group interaction, respect diversity and sharing creative ideas based on the basic level science and health curriculum aiming at promoting inquiry learning through collaboration. A quantitative analysis involving the use of the Chi-square test at 0.05 level of significance, Likelihood ratio and Somer's symmetric was conducted to see the association between the variables. The results showed that science and health collaborative learning activities by gender were not associated significantly. There was no statistically significant difference (α=0.05) between the variables studied. The findings showed a weak association with gender and collaborative science and health learning activities in the classrooms.

Keywords: collaborative learning, community school, gender, group interaction

1. Background

For years, basic level community school students in Nepal engaged in the traditional ways of pedagogical approaches such as dictation and lecturing in controlled classroom environment to secure high marks in the examination. Learn and understand science and health concepts at the school science and health classes were neglected. In Nepalese classroom, recent pedagogical and methodological approaches such as collaborative learning, discussion, argumentation, demonstration and activity-based inquiry is not practice for a long period of time (Acharya, 2019a; Bajracharya & Brouwer, 1997; Curşeu, Chappin, & Jansen, 2018). The practices of recitation and note keeping do not favour in group collaboration and not encourage meaningful engagement among students (Acharya, 2016; Cimermanová, 2018). School-level pupils often encounter learning complications in such an isolated learning environment and did not see the utility of their daily course activities (Schmidt, Kafkas, Maier, Shumow, & Kackar-Cam, 2019). As a result, the students' understanding of the real meaning of science and health and its connection with the livelihood activities is in danger.

To advocate this significant problem in science and health learning and science education transformations in the school system, the government of Nepal drafted a policy of science learning from the school garden *'One Garden One School'*. It highlights the teaching and learning science and health concepts through collaboration among the students and teachers through the meaningful engagement of students and teachers. Prioritizing the importance of collaborative learning, literature reveal that practices of developing basic science and health concepts by involving students in hands-on activities promote desired achievement (Acharya, 2017a, 2019b). However, only involving students in activities may not understand science concepts (Kaya, Erduran, Aksoz, & Akgun, 2019; Koirala & Acharya, 2005; Mahat, 2004; Ogawa, 1995). The major concern of this study is that the understanding and the achievement of science is not good as the science teachers in the schools of Nepal believe on the *banking concept* and *rote memorization* (Acharya, 2019c; Reis, Isotani, Rodriguez, Lyra, Jaques, & Bittencourt, 2018). To support the importance of collaboration, the researcher argues that "collaboration is necessary to improve the skills of

problem-solving, science process and self-confidence of primary school teacher candidates" (Alfin & Fuad, 2019, p. 1). Taking into consideration the science teachers hold in shaping the practices of teaching and students' learning environment in science, the desired change in school science depends heavily upon the capability of science teachers and students through collaboration. However, in an overview of science teachers' beliefs in understanding science concepts, collaboration is must among students and science teachers and it is possible by project-based learning (Isotani et al., 2018; Tsybulsky & Muchnik-Rozanov, 2019). Thus, the anticipated change put forward by curricula reforms, putting emphasis on scientific inquiry and engages students meaningfully in science classes through the meaningful engagement by collaboration. Providing students with real quality learning activities in relevant situations is must beyond the textbooks. It is vital for helping them to develop collaborative skills from a variety of perspectives.

Furthermore, to connect students' collaboration through inquiry, Garcia-Carmona (2019) argues:

"… experiences outside the classroom enhance learning by providing students with opportunities to practice skills of inquiry, and problem-solving in everyday situations and also to explore the relationship between collaborative skills linking with science learning activities for activity-based inquiry learning by gender among the students" (p. 21).

Science learning primarily based on learning experiences (Kaya, Erduran, Aksoz, & Akgun, 2019; Tofel-Grehl, Searle, & Feldon, 2018). Comprehensive understanding of collaborative learning can be supported by the cooperative teachers' activities (Erdogan, 2019). Knowledge co-creation by the collaboration is an urgent need at the basic level community schools in Nepal. School science teachers simply facilitate students to solve the problems by solving difficult questions on the blackboard. They do not care either students understanding the real meaning of subject matter or the basic science concept (Acharya, 2019d). Scaffolding students to understand science concepts is beyond the knowledge of science teachers (Smit, Gijsel, Hotze, & Bakker, 2018; Van Driel, Slot, & Bakker, 2018). Collaborative learning among the students was not practised by science teachers rather they opt to maintain strict discipline in the silent mode of the classroom situation. Research shows that sharing ideas for knowledge generation is almost negligible in science classrooms (Bajracharya & Brouwer, 1997).

2. Introduction

This study introduced the comparison of the effectiveness of collaborative learning among boys and girls in the basic level community schools in Nepal. The purpose of this study was to compare the effectiveness of collaborative learning strategy to scaffold science learning activities. To improve the quality of teaching and learning science through collaborative learning activities, an assessment is required before launching activities in the school. This study will ultimately help in the transformation of science learning activities from chalk and talk method to collaborative learning in science and health subjects among the students at basic level community schools in Nepal. On the basis of theoretical and experimental studies, collaborative learning is regarded as an important determining factor to achieve the goal of science education. Science education ultimately helps to uplift the scientific literacy in the nation. Researchers proposed that the effective implementation of collaborative learning help to form a cooperative society as the students understand the real meaning of society and ultimately human life. Although the direct correlations between collaboration and achievement as observed in empirical survey studies, it is clear that sharing experiences is imperative, especially in the long run to transform the society through the knowledge of science education (Evens, 2019; Mora-Ruano, Heine, & Gebhardt, 2019; Torres, 2019).

Education era was introduced in Nepal with the establishment of Durbar school in 1853 in affiliation with Calcutta University. From that time, the learning culture was totally based on lecturing the ideas while teaching science. Moreover, Tribhuvan Chandra College was established in 1918 in affiliation with Calcutta University for higher education in Nepal. At that time, the enrollment of girls in the schools and the university was negligible. Parents did not send their daughters for education. Parents assumed that females must do work at home and help for agricultural production. In the college-level science learning, the same approach was dominant till today. Science education in schools in Nepal is compulsory at the lower secondary and secondary level and optional at the higher secondary level. Science for all up to secondary level is for the general education and science at the higher secondary level is for a broad specialized education (Aikenhead, 2006). Science and technology education has become an integral part of the school curriculum in almost all the countries of the world (Taştan, 2018; Toma & Greca, 2018). The teaching of science in schools is of greater interest today than it was in the past especially at the secondary level (Appleton, 2003; Hofstein & Lunetta, 1982; Lavonen & Laaksonen, 2009). Learning by collaboration was totally isolated from the schools to the universities of Nepal. It creates the problems of misunderstanding the basic concepts of science.

When we see the history of nature of science education in Nepal, it has a long history. Tribhuvan University was

established in 1959 which is the oldest university in Nepal in which the enrollment rate of females was very low. At that time, the teaching of science was conducted at higher level. In order to give momentum to the teaching of science for boys and girls at the school level, Science Education Development Center (SEDEC) was established under the Science Education Development Project (SEDP) under the Ministry of Education. From the very beginning, the quality of science education at school level is very poor (Prakash, Yadav, & Yadav, 2018; Upadhyay, Tiwari, & Ghimire, 2018). It is because of poor teaching, lack of instructional materials and library facilities (Acharya, 2019d; Sharma, 2014). Moreover, the lack of effective planning, management, teacher training and examination system has added much to its poor quality. In order to improve the quality of school science education, the government established a science education project for the first time in Nepal in 1982. The aim of the science education project was to improve the quality of school science education through upgrading science teaching skills and facilities through collaboration. The main components of this project were: (a) construction of new buildings and rehabilitation of existing buildings including staff and student accommodation at selected project instituting; (b) provision of science laboratory; (c) provision of academic consultant services in specific fields; and (d) provision of in-country and international staff development fellowships.

To address the importance of practical activities through collaboration in the community schools in Nepal, Science Education Development Centre was successful in building Science Education Development Unit at twenty-five selected districts throughout Nepal. Thus established such a center was assigned the role of carrying out training to school science teachers from adjoining districts. However, Science Education Development Centre could not carry out into expected targets because of lack of expertise and vision in the field of science education. To uplift the condition of collaborative learning in science education, science subject was made compulsory from grade six to ten. In order to achieve universalization of primary education, primary level (grade 1-5) was limited to three years' period from the previous five years. Similarly with the aims to impart basic knowledge as well as prevocational skills and to build character the previous middle school of three years was extended to four years from grade four to seven which was called lower secondary level in the school system in Nepal.

Acharya (2019) argued that collaborative learning is a set of teaching and learning strategies that promotes students' collaboration in small groups in order to optimize their learning. Science teachers in recent years are adopting to organize different types of collaborative learning activities in their classroom for science teaching. However, research also shows that the implementation of collaborative learning is not always adequate in daily classroom practices. This study explores the status of collaborative learning by gender in science in the Community Schools in Nepal.

3. Methodology

3.1 Research Design

The quantitative research design was used in this study. A quantitative study is undertaken to explore the collaborative strategy by gender in the community school in Nepal. Quantitative data were collected from grades five, six and seven from a community school were collected and analyzed by the use of SPSS software.

3.2 Sample of the Study

The data presented here are the primary data from one school were analyzed. A total of two hundred and fifty-eight students from five, six and seven grades were selected for the purpose of the study. Students of each grade were divided into groups consisting of 10-15 students depending on the nature of task in each grade. Written consent was taken from all the students and the teachers who participated in the study. The participants were chosen through a combination of purposeful and purposive sampling. These sampling techniques enabled me to select students from different locality and areas. They were asked to participate in the study and a consent letter was taken from the school headteacher and oral consent from each and every student. There was no purpose of selecting students from the classrooms except science and health subject.

Table 1. Sample number of students

Grade	Number of students	Percentage
Five	57	22.10
Six	96	37.20
Seven	105	40.70
Total	258	100.00

The study was conducted in a community high school in Nepal. The school is one of the good school in terms of the result of the District Level Examination (DLE) and School Level Certificate (SLC). Two hindered and fifty-eight students of five to seven grades, aged 11-14 years have participated in collaborative learning sessions in the science and health subject. There were 116 (45%) were girls and 142 (55%) were boys. Participants came from three different classes taught by two teachers of science and health subject.

4. Data Analysis and Interpretation

Inferential statistics were used to see the association between the variables in this study. Classroom interactive sessions and discussion on collaborative science and health learning activities by gender were studied and analyzed based on quantitative research design.

Chi-square test at 0.05 levels of significance was performed in order to understand whether there is an association with the gender of students of grade 5th, 6th and 7th of a school with the collaborative learning activities. Assumptions were taken before shepherding Chi-square test analysis; the expectations of the investigation were checked. The followings were tested as (a) impartiality of interpretations; (b) homogeneousness of variable; (c) two variables measured at an ordinal or nominal level; (d) two variables comprising two or more categorical, independent groups; and (e) the levels (or categories) of the variables should be equally exclusive. In all statistical tests, α = 0.05 significance level was using SPSS programme of data analysis.

5. Results

5.1 Implementation of the Study

Due to strict school rules, no student dropped out during the study period. For all the students in the study, there had been no significant gender difference in any of their previous regular science classes. In condition girl and boy students were randomly grouped to solve the problems in a collaborative learning setting in science class. It is interesting to note that when the girl students knew that they were to be discussed with a boy student, other in the group raised their hands and asked to be allowed to work with them. But, it was not similar in all the classes and grades. The study was based on a quantitative analysis of the students' learning activities through collaborative and cooperative through meaningful discussion. All interactions and collaborations were documented from each class by the first author of this article. These included their visual and verbal conservations.

5.2 Knowledge Elaboration

Based on students' collaborative activities during the class observations, we found obstacles to effective collaboration and three antecedents that might help explain the obstacles. By frequently occurring obstacles, we mean obstacles that were mentioned by a significant number of students (30% of the participants. As the result shown to us central to these antecedents is the strong focus of most students on the affective and psychomotor aspects of collaborative learning and their low attention to the collaborative aspects. This imbalance in their activities reflected in the ways students set collaborative goals neglected to instruct students in essential collaborative skills, and assessed collaboration. As a consequence, these interrelated antecedents may negatively affect student collaboration. Students merely aimed to achieve individual learning and neglected the importance of meaningful interaction. When both teachers and students do not pay a lot of attention to the collaborative aspects in gaining the concept of science, they may experience a number of obstacles to the effectiveness of collaborative learning.

5.3 Statistical Analysis

Inferential statistics of the association between the classroom interactions for collaborative science and health learning with the background of students is given in the below tables. Three collaborative skills, my class is interactive, I ask questions in the class and I share my ideas with my friends were analyzed using Chi square test at 0.05 level of significance, Likelihood ratio, Somer's symmetric was conducted to see the association between the variables: gender with science learning collaborative activities.

Table 2. Our class is interactive in teaching and learning science

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.021[a]	6	.124
Likelihood Ratio	11.633	6	.071
N of Valid Cases	258		

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is .59.

Table 3. Ask questions with the science teachers without fear

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.891[a]	6	.691
Likelihood Ratio	3.988	6	.678
N of Valid Cases	258		

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .26.

Table 4. The directional measures of dependent variable

			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
		Symmetric	.071	.044	1.589	.112
Ordinal by Ordinal	Somers' d	Caste/Ethnicity Dependent	.100	.063	1.589	.112
		I ask questions in the class Dependent	.054	.034	1.589	.112

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Table 5. Share our ideas with my friends

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.665[a]	9	.378
Likelihood Ratio	9.970	9	.353
N of Valid Cases	403		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .02.

Table 6. Directional measures of dependent variable

			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
		Symmetric	.046	.045	1.010	.312
Ordinal by Ordinal	Somers' d	Caste/Ethnicity Dependent	.056	.055	1.010	.312
		I share my ideas with my friends Dependent	.039	.038	1.010	.312

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Table 7. Symmetric measures Cramer's value, contingency coefficient and Kendall's effect

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
	Phi	.155			.378
Nominal by Nominal	Cramer's V	.089			.378
	Contingency Coefficient	.153			.378
Ordinal by Ordinal	Kendall's tau-b	.046	.046	1.010	.312
	Kendall's tau-c	.032	.032	1.010	.312
N of Valid Cases		403			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Table 8. Can freely ask questions with the teachers

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.339[a]	9	.500
Likelihood Ratio	8.789	9	.457
N of Valid Cases	258		

a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .02.

Table 9. Directional measures of dependent variable

			Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Somers' d	Symmetric	.037	.044	.833	.405
		Caste/Ethnicity Dependent	.043	.052	.833	.405
		We ask questions with our teachers Dependent	.032	.038	.833	.405

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Table 10. Cramer's value, contingency coefficient and Kendall's effect of valid case

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.144			.500
	Cramer's V	.083			.500
	Contingency Coefficient	.142			.500
Ordinal by Ordinal	Kendall's tau-b	.037	.045	.833	.405
	Kendall's tau-c	.027	.032	.833	.405
N of Valid Cases		258			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

The phi coefficient or mean square contingency coefficient (φ) is a measure of association for two variables i.e., gender and collaborative activities. Although the Pearson correlation coefficient reduces the phi coefficient in this case, they are not, in general the same. The Pearson correlation coefficient ranges from −1 to +1, where ±1 indicates perfect agreement or disagreement, and 0 indicates no relationship. The phi coefficient has a maximum value that is determined by the distribution of the two variables if one or both variables can take on more than two values. The result shows that the value of phi is less than 1 indicating the weak relation between the variables. Pearson's chi-squared test (χ^2) is a statistical test applied in this study to evaluate how likely there is the difference between the variables. The result shows that there is a negligible relationship between gender and collaborative learning strategies.

6. Conclusion

The results of this study show that there is no visible difference in collaborative activities between the male and female students in science and health teaching and learning at the basic level community school in Nepal. Asking questions with science teachers about the conceptual understanding of science concepts, sharing course contents with peers and receiving innovative ideas among the friends and augmenting the views of students on interactive classes were the statements used to compare the collaborative learning strategies among the boy and girl students. Devoid of questioning schoolchildren to contemplate and response the prearranged interrogations independently afore discoursing with group members, the fabrication of group collaboration may not work well.

Tables 2-10 show the calculated values of Pearson Chi-Square are 0.124, 0.691, 0.378, 0.500 and that of Likelihood ratio are 0.710, 0.678, 0.353 and 0.457. Similarly, the value of Phi is 0.155. Cramer's values are 0.089 and 0.083 in both the cases. In the same way, the calculated values of Contingency Coefficient 0.153 and 0.142. Similarly, Kendall's tau-b and Kendal's tau-c values are 0.046, 0.037 and 0.320 and 0.027 respectively. All these values clearly show that there is a weak association between gender and collaborative learning.

7. Discussion and Recommendations

This study investigated the situation and compared collaborative learning activities between conducted by boys

and girls in science and health lessons at the basic level. A weak association was found between collaborative and cooperative learning activities by gender among the students. The finding was similar to the prior research showing that the lack of interpersonal and skills may not only impede group interaction but also stifle individual and collaborative learning (Shimazoe & Aldrich, 2010; Webb, Nemer, & Zuniga, 2002). When students are inexperienced in collaboration, they are unable to contribute fully to the assigned tasks. This may lead to low performance in collaborative learning, which has been extensively discussed in collaborative learning literature (e.g. Freeman & Greenacre, 2010; Popov et al., 2012). The finding by Bunderson and Reagans (2011) shows that competence status suppresses collective learning in such a way that low-status students are inhibited in participating actively and are often underestimated, whereas high-status peers have more chances to contribute and tend to ignore the efforts of low-status members. Collaborative learning becomes good among friends because friends tend to socialize more than focusing on group tasks (Janssen, Erkens, Kirschner, & Kanselaar, 2009). Furthermore, one may forget their individual responsibility without being criticized by other group members.

The findings showed that a weak association between the gender of students with the collaborative skills to learn science. In addition, no significant difference was found among the collaborative skills of the students.

Furthermore, gaining the information of collaborative techniques is significant for science and health understanding for the transformation of the chalk and talk teaching approach to collaborative learning in basic level science and health classes. The analysis provides a basis for the formulation of tentative design principles of collaborative learning to learn science concepts in basic community school education. This study suggests that learning science needs to open up discussions and argumentation for students.

This is a small research that may not represent the overall scenario of community schools of Nepal. It is recommended that it would be better to implement similar research tools and techniques on science teachers, parents and students along with the classroom observation with a qualitative research design to better understand collaborative learning approaches. It is also recommended that such research should be applied the area sample size and population represents all the ecological zones of Nepal.

Acknowledgements

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