

# Collaborative Learning, Gender Groupings and Mathematics Performance

**EDGAR JULIUS A. LIM**

ORCID No. 0000-0002-9485-065X

sluj\_0918@yahoo.com

Eastern Samar State University

Borongan City, Philippines

## ABSTRACT

The study was conducted to find how students perform in class if they work in groups. It also wanted to find out which gender groupings would students be working comfortably and obtaining better results. Experimental research design was utilized where the subjects were randomly assigned. The subjects of this study was composed of 9 groups, three all-male groups, three all-female groups, and three mixed groups. Using ANOVA, data revealed that the subjects' formative tests mean score had no significant difference which implies that subjects if working by himself/herself obtained more or less similar results due to they were randomly assigned. While the collaborative learning where the subjects worked in different gender groups showed that there was a significant difference in their performance where all-female groups obtained the highest mean score followed by mixed groups implying that if subjects work with whom they are comfortable would have better results. In the Math achievement test which was taken individually posted that there is a significant difference in the mean scores obtained due to the level of improvement of their learning which could be attributed with whom they worked and learned the concepts.

**Keywords:** Collaborative learning, gender groupings, math performance

## INTRODUCTION

How do students perform in a math class if they work according to gender groupings? Davidson, and Major (2014) mentioned that the development of learning in small groups in higher education has occurred, in part, because of

strong evidence indicating that students working in small groups outperform their counterparts in a number of key areas. These include knowledge development, thinking skills, social skills, and course satisfaction. Zurita, Nussbaum and Salinas (2005) pointed out that how the participating groups are composed, is one of the most important decisions to be made in a collaborative learning activity. These compositions produce different learning and social interaction results. The ability to change the group member composition in real time and dynamically enables the leveling up of learning results and improvements in the participants' social relationships. Changes in composition also facilitate the analysis of the best criteria to be used in a determined activity.

According to Hein & Budny (1999), some forms of group learning have become more mainstream than others; hence, these provide useful direction for faculty to consider as they weigh the options. The way children learn can affect how well they learn. There are studies which indicate that boys and girls have different styles for learning, and student success can be linked to learning styles. Hall (2008) mentioned that boys' and girls' brains develop differently. While girls develop verbal/linguistic skills early, boys' brains concentrate on spatial and kinesthetic intelligences. Boys need more movement than girls while they learn which often results in discipline difficulties in the classroom. It has been shown that male and female students interact with group members differently and that in mixed gender groups males tend to dominate (Guzzetti and Williams, 1996). Therefore it is proposed that using single gender groups will enable female students to more actively participate. This study will explore the effect that arranging cooperative learning groups by gender has on the performance of students and their level of active engagement.

Roschelle & Teasley (1991) cited that collaboration may be described as the mutual commitment of members of a small group to coordinate their efforts in order to solve a problem. Furthermore, in such an environment students can acquire new skills, ideas and knowledge by working together to build solutions to educative problems (as mentioned by Zurita *et al.*, 2005). Matthews (1992) found that high-ability students prefer cooperative learning in homogeneous ability groups than heterogeneous ability groups. This means that students who are academically more inclined prefer to form a group with those who are as equal or more academically inclined rather than being grouped with a student of lower ability (as mentioned by Samsudin, 2006).

It is on this light why the researcher was motivated to pursue this study, to find out how the students will perform if they work in groups. Moreover wanting

to find out at what kind of groupings they will be performing better.

## FRAMEWORK

The study is anchored on Albert Bandura's Social Learning Theory which posits that learning is a cognitive process that takes place in a social context and can occur purely through observation or direct instruction, even in the absence of direct reinforcement.

Social modeling is a powerful method of education. If learners see positive consequences from a particular behavior, they are more likely to repeat the behavior themselves. Students are more motivated to work if they see others around them also working.

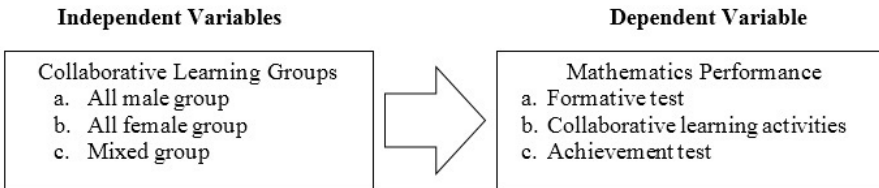


Figure 1. The Conceptual Framework of the Study

## OBJECTIVES OF THE STUDY

The study determined the effects of Collaborative Learning and Gender Groupings in the Mathematics Performance of Bachelor of Elementary Education (BEED) Students.

Specifically, this study aimed to find out (1) the performance of the students in the following: a) Formative test, b) Collaborative learning activities, and c) Achievement test and (2) if there is a significant difference in the performance of the students in the following: a) Formative test, b) Collaborative learning activities, and c) Achievement test.

## METHODOLOGY

This study utilized the experimental research design. It determined the effects of collaborative learning by gender groupings in the mathematics performance of the subjects of this study which was composed of nine (9) groups, three groups

are all male members, another three are all female groups, and the last three were mixed groups with two male and two female members for a total of 18 male and 18 female students.

The study utilized teacher-made formative tests, collaborative learning activities and an achievement test. A dry-run was conducted and item analysis was done to validate the instrument. The final copy was subjected to face and content validation by a fellow math teacher.

An approval to conduct the study was secured from the Dean of the College. Then, series of discussion followed by collaborative learning activities by gender groupings, formative tests and an achievement test were administered at the end of the study. The mean was used to find the average of the formative tests, cooperative learning activity outputs and achievement test. ANOVA was used in comparing the performance of the three collaborative learning groups in their formative tests, cooperative learning activity outputs, and achievement test.

## RESULTS AND DISCUSSION

Table 1. Formative Test, Collaborative Activity and Math Achievement Mean Scores of the Three Gender Groups

Groups	Formative Test		Collaborative Activity		Math Achievement	
	Mean	Interpretation	Mean	Interpretation	Mean	Interpretation
All male Group	27.00	Average	34.17	Average	41.67	Above Average
All female group	27.67	Average	42.42	Above Average	45.17	Above Average
Mixed group	27.33	Average	38.67	Above Average	43.17	Above Average

Table 1 presents the mean scores of the three gender groups in their formative tests, collaborative activity and math achievement. It shows that the all female group obtained the highest mean in their formative test at 27.67 and all male group obtaining the lowest mean at 27.00; however, all mean scores are interpreted as average. This implies that students when working alone, more or less obtains similar scores in their individual formative tests.

The table also presents the mean scores of the three gender groups in their collaborative activities. The female group posted the highest mean at 42.42 (above average), the mixed group obtained a mean of 38.67 interpreted as above

average and the male group got the lowest mean of 34.17 (average). The result implies that the female group performed better than the male group, while male students combined to work with female students performed better as compared to if they are grouped with fellow male students.

It also reveals the mean scores of the three gender groups in their math achievement test. The female group obtained the highest mean of 45.17 as compared to the mixed group with an average score of 43.17 and the male group with the mean of 41.67. The results show that all has an above average performance. The means vary, the differences are negligible, all groups performed better at the end of the experiment. The final result of the experiment implies that collaborative learning and gender groupings may have affected the performance of the students in their achievement test.

This is in consonance with the study of Porter (2004) "The Effects of Gender Grouping and Learning Style on Student Curiosity in Modular Technology Education Laboratories" which revealed that the overall scores for girl/girl groupings were higher than girl/boy and boy/boy groupings, and scores for girl/boy groupings were higher than boy/boy groupings.

Table 2. ANOVA of the Formative Test in the Three Gender Groups

Source of Variation	Sum Squares	df	MSS	F	Tabular value	interpretation
Between Columns	18	2	9	0.32	3.29	Not Significant
Within Columns	910	33	27.58			
Total	928	35				

Table 2 shows the ANOVA of the formative test results in the three gender groups with the computed F value of 0.32 less than the tabular value of 3.29 revealing that there is no significant difference in their test results. The result is in consonance with the null hypothesis that there is no significant difference in the formative test in the three different gender groups. This result implies that if tests are taken individually the scores of the subjects will not differ significantly.

Table 3. ANOVA of the Collaborative Activity in the Three Gender Groups

Source of Variation	Sum Squares	df	MSS	F	Tabular value	interpretation
Between Columns	2.67	2	1.33	3.35	3.29	Significant
Within Columns	125.33	33	3.8			
Total	128	35				

The ANOVA table presented in Table 3 shows the collaborative activity results in the three gender groups with the computed F value of 3.35 which is greater than the tabular value of 3.29 revealing that there is a significant difference in the results. The result opposes the null hypothesis that there is no significant difference in the collaborative learning activities in the three different gender groups. It implies that students working in different gender groups had great effect in their collaborative learning outputs.

Table 4. ANOVA of the Math Achievement in the Three Gender Groups

Source of Variation	Sum of Squares	of Df	MSS	F	Tabular value	interpretation
Between Columns	169.55	2	84.77	21.55	3.29	Significant
Within Columns	67.46	33	2.04			
Total	237.01	35				

Table 4 is the ANOVA table showing the math achievement test results in the three gender groups with the computed F value of 21.55 which is greater than the tabular value of 3.29 revealing that there is a significant difference in their test results, implying that the students, after having been exposed to collaborative learning and gender group activities, significantly vary in their mathematics achievement. The result rejects the null hypothesis stating that there is no significant difference in the mathematics achievement in the three different gender groups.

## CONCLUSIONS

Based on the results, the following conclusions were formulated:

Although the three gender groups obtained different means in their formative tests, the differences was very minimal, negligible enough to say that all students under study performs similarly when working individually. In the collaborative learning activities, the three gender groups obtained high differences in their mean, where the all-male groups performed very far from the all-female groups, which can be concluded that female students when grouped together turns out better results than all male students grouped together. The mean scores of the three gender groups in their Math achievement test given after the experimentation, tells that though the all-male group obtained the lowest mean, they still performed

very well in their achievement test.

Based on statistics, (1) there was no significant difference in the mean scores obtained by the three gender groups in their formative test, probably because the students under study have similar abilities when working individually; (2) there was a significant difference in the mean of the collaborative learning activities in the three gender groups, probably because performance of collaborative learning activities depends on who do we work with; and (3) the mean in the math achievement test of the three gender groups varies significantly due to the effect of the collaborative learning activities.

## RECOMMENDATIONS

The following recommendations are presented:

1. Mathematics teachers should know their students before starting the course to enable the former to select and employ the appropriate teaching approach and strategy;
2. Teachers should utilize collaborative learning and gender groupings as a teaching approach to ensure learning in the student;
3. School administrators should encourage professors to use other teaching approaches like collaborative learning and gender groupings making the students the center of the teaching-learning process;
4. School administrator should send instructors and professors to seminars on new trends in education, strategies and approaches; and
5. Future researchers may conduct a similar study.

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