Group Learning among Secondary Learners in Bangladesh

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Abstract: Group Learning (GL) is well recognized as a successful pedagogy in mathematics education. The purpose of this research study was to compare the effects of GL and conventional learning on mathematics achievement among secondary learners in Bangladesh. Quasi-experimental design was administered for the experiment into 2-group: an Experimental (EG) Group and a Control (CG) group. EG was exposed to GL treatment while CG was taught using Conventional Learning Method for the duration of 15 weeks. Data were collected using students' mathematics achievement test. Both EG and CG were compared using independent-sample t-test. It was found that GL had significant effect on mathematics achievement. The MANOVA with repeated measure was employed to determine the main and interaction effect of GL on test-time and achievement. The multivariate tests indicated a significant main effect of time and a significant interaction effect of GL by time. These findings suggest that GL is more effective than conventional learning in mathematics teaching. As such GL can be effectively incorporated to improve students' mathematics performance in secondary schools in Bangladesh.

Key words: Group learning, mathematics achievement, quasi-experimental design, education, Malaysia

INTRODUCTION

Group learning is well documented as an effective pedagogy in mathematics education throughout the world. Group learning is the instructional use of small groups through which students work together to maximize their own and each other's learning (Johnson and Johnson, 1999). Group learning brings together students working together to accomplish shared goals is an instructional approach in which high-ability and low-ability students work together to solve a problem. There are many strategies in group learning such as Student Teams-Achievement Division (STAD), Teams Games Tournaments (TGT), Team Accelerated Instruction (TAI), Cooperative Integrated Reading and Composition (CIRC), Jigsaw and Group Investigation (GI), etc. but the researcher in this study has focused on Johnson and Johnson (1999)'s Learning Together Model because their approach of developing group learning based on five basic principles is widely applicable in any GL situation. Vaughan (2002) supported Johnson and Johnson's Model that Learning Together, a group learning strategy is crucial to the cultivation of individual and academic success.

Johnson et al. (1991) reviewed 168 studies comparing group learning to traditional styles of instruction focusing on student achievement to strengthen the case for using group learning in mathematics. They found that the use of group learning facilitated learning in an active rather than a passive way. They claim that group learning must be employed in mathematics classes if mathematics instruction is to help students think mathematically, understand the relationships among various mathematical facts and formulas and apply mathematical knowledge. Rimmerman (2004) referred to Johnson and Johnson's work as the modern era of group learning. Their model of group learning is known as Learning Together and can be applied to any discipline and grade level. Johnson and Johnson (2004) in their study stated that since, 1897 over 550 experimental studies have been conducted on group learning in different disciplines and the results indicated that the effect of group learning promote more positive attitudes toward the task as well as cooperation tends to promote higher achievement. Thus, the major objective of this study was to compare the effects of group learning on mathematics achievement among secondary learners in Bangladesh.

Problem statement: The first major public examination Secondary School Certificate (SSC) is significant for pupils and guardians all over Bangladesh. The result of SSC has a great significance to success of both individual and communal life. The percentage of students' passing the SSC at many rural secondary schools as seen in years 2000, 2001, 2003, 2004 and 2005 were found <20% (BISE, 2005). These reflect poor quality of secondary education, specifically with most of the students failed in mathematics. As a group, children from these rural

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schools were from disadvantaged and low-income families thus performed substantially worse in mathematics than their counterparts from higher-income families. This result in significant racial and social-class disparities in mathematics learning may also be linked to diminished learning opportunities. Samad (2005) reported that based on samples of Bangladesh's secondary students mathematics performance, there is crucial need to improve and reinforce students' mathematical knowledge through various ways of instructions. What it required is some creativity and endeavor on the part of the teacher and perhaps this is where we are suffering for the traditional mode of teaching. Therefore, to minimize the failing rate in SSC examination, teachers should find ways to enhance students' learning. The poor performance among students may be due to lack or insufficient considerations of meaningful, explicit, situational, social and student-specific learning taking place in the classrooms. Bottge (2001) identified these (meaningful, explicit, situational, social and student-specific contexts) as the key to learning mathematics, especially for the low ability students. Azizah and Chong (1999) and Effandi (2003) also mentioned from the findings of their studies which have been conducted in Malaysia that group learning enhance mathematics performance among students and promote positive attitudes toward mathematics than the traditional way of teaching. The effectiveness of group learning has shown rapid growth in mathematics achievement and attitudes toward mathematics in various studies (Barbato, 2000; Zakaria and Iksan, 2007; Johnson and Johnson, 2004; Kolawole, 2007; Martin, 2005; Ozsoy and Yildiz, 2004). Hence, group learning lends some promising endeavor in teaching and learning mathematics, specifically for Bangladesh learners.

This study was conducted to examine the effects of group learning on mathematics achievement; specifically the objectives of this study were:

- To compare the effects of group learning and conventional learning on mathematics achievement among secondary learners in Natore, Bangladesh
- To determine the effects of group learning and conventional learning on mathematics achievement based on repeated measures of test performance over the 15 weeks of intervention period

MATERIALS AND METHODS

The quasi-experimental pre-test post-test control group design was employed. A total of 168 full-time students from four secondary schools in Bangladesh constituted the sample of the study and were assigned to

Table 1: Pre-post test control group design

Groups	Pre-test	Treatment	Post-test
Experimental (EG) (n = 84)	0_1	X	0_2
Conventional (CG) (n = 84)	0_1	-	0_2

one of the two groups, the experimental group undergone the group learning mode whilst the other, the conventional mode of learning.

The group learning mode was based on the Learning Together Model of Johnson and Johnson (1999). A pre-test of students' mathematics achievement was administered to both groups. The group learning (EG) and the Conventional Group (CG) were guided by the same teachers in one academic session for the duration of 15 weeks of classroom teaching. Post-test of students' mathematics achievement was administered to both EG and CG. Table 1 shows a graphic form of the quasi-experimental design.

RESULTS AND DISCUSSION

Results of this study are presented based on the objectives stated earlier. Students' mathematics achievement in post-test was reported. To compare the effects of group learning and conventional learning on mathematics achievement among secondary learners in Natore, Bangladesh.

Independent-sample t-test was conducted in comparing the mathematics achievements of the two groups. The EG group scored mean of 47.35 (SD = 2.64) which is higher than the CG group with mean score of 34.97 (SD = 1.99). Findings indicated that there is statistically significant difference in mathematics achievement post-test mean scores between students in EG and CG. As shown in Table 2, a significant difference was found t (166) = (34.25, $p<0.05$) in favor of the EG which revealed that the performance of EG was significantly better than CG. Hence, these suggest that the group learning intervention showed positive impact in enhancing students' mathematics achievement.

To determine the effects of group learning and conventional learning on mathematics achievement based on repeated measures of test performance over the 15 weeks of intervention period. The Multivariate Analysis of Variance (MANOVA) with repeated measures was used to examine the main effect of group learning and different test-time as well as the interaction between them. The multivariate analysis of variance illustrated main and interaction effect on the variable identified at the 0.05 level of significance. Table 3 shows the overall multivariate test results.

The multivariate tests indicates a significant main effect of time, Wilks' Lambda = 0.065, F = (1, 166) =

Table 2: Independent-sample t-test comparing mean of mathematics achievement post-test score between EG and CG

Groups	N	Mean	SD	t	df	Sig. (2-tailed)
EG	84	47.35	2.64	34.25	166	0.00
CG	84	34.97	1.99	-	-	-

Table 3: MANOVA with repeated measure (main and interaction effect of GL and test time)

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta squared	Observed power
Testtime (Wilks'Lambda)	0.065	2373.307	1.000	166.000	0.000	0.935	1.000
Testtime* Method (Wilks'Lambda)	0.310	369.802	1.000	166.000	-	0.690	1.000

2373.307, p = 0.000, η^2 = 0.935 and a significant interaction effect of GL by time, Wilks' Lambda = 0.310, F (1, 166) = 369.802, p = 0.000, η^2 = 0.690. Observed power for all factors was 1.000. There was a difference in the students' mathematics performance before and after exposure to GL as measured and indicated by the pre-test and post-test score of the students' mathematics achievement test, the MANOVA with repeated measures indicated that there was an interaction between GL and test time. The multivariate tests shows a significant main effect of time in affecting the students' mathematics achievement post-test score and the interaction effects of GL by time were also significant at 0.05 level. Thus, these findings imply that GL intervention had significant impact in improving students' mathematics performance.

Based on the results presented above, the effect of Learning Together Model of GL on mathematics achievement was significant. The results show that the experimental students significantly improved their mathematics achievement in comparison to conventional students. The students in the EG significantly outperformed the CG students after Learning Together Model of GL implementation.

The findings of this study, therefore are consistent with the results of similar research studies as shown by the studies of Johnson and Johnson (1999) and Barbato (2000). The findings of this study are also consistent with studies by Effandi (2003), Kolawole (2007), Ozsoy and Yildiz (2004) and Zakaria and Iksan (2007). The findings are in contrast to the findings by Mwerinde and Ebert and support the results reported by Martin (2005) as well as in line with the findings by Vaughan (2002).

CONCLUSION

This study compared the effects of group learning and conventional learning on students' mathematics achievement among secondary learners in Bangladesh. A significant difference in students' mathematics achievement was found between group and conventional learners. After completion of the treatment, experimental group students showed significant improvement in students' mathematics achievement in comparison to control group students. The findings revealed that the development of the students' mathematics achievement for the experimental group was due to the significant effects of the group learning and students in the experimental group found their mathematics class to be more interesting after group learning treatment and learned how to work cooperatively to achieve shared group goals.

RECOMMENDATIONS

Based on the findings, it is strongly recommended that group learning can successfully be incorporated in the secondary school context as an effective pedagogy to promote students' mathematics performance and to foster cooperation and collaboration among learners in mathematics classrooms in Bangladesh. Thus, education authorities should encourage secondary teachers to implement group learning and teacher education institutions to make it part of their curriculum content.

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