Supporting "Student-Network" with the Principles of Cooperative Learning: Effects and Implications

Nigusse Weldemariam Reda[1]
Mekelle University, Institute of Pedagogical Sciences, email: kg_weldie@yahoo.com
Tsegay Girmay Hagos
Mekelle University, Institute of Pedagogical Sciences, email: tsegay_2003@yahoo.com
Mulugeta Tsegai Gebre-eyesus
Mekelle University, Institute of Pedagogical Sciences, email: mulutk@gmail.com
Samson Fikadu Weldie
Mekelle University, Institute of Pedagogical Sciences, email: samfek@gmail.com

Abstract

The study examined the effects of student-network supported by the five principles of cooperative learning on students' academic achievement. Accordingly, the study followed a quasi-experimental design to meet its purposes. In so doing, two schools (one each from primary and general secondary) were selected through probability (multistage) and nonprobability (convenient) sampling techniques. The convenient sampling technique was used to select the zone/town where the schools are found. Following this, grade seven and grade nine were selected from the schools using simple random and purposeful sampling techniques respectively. Then after, a pre-test (on Mathematics, English and Physics subjects) were administered to grade seven and nine students to select comparable and treatment groups. Consequently, comparable treatment and comparable groups were identified. The treatment groups were then given three days training on the five principles of cooperative learning. In addition, the treatment groups received hands-on support on the principles of cooperative learning during their actual student network discussions. Finally, post-test was administered to all groups and the results imply that the treatment and comparable groups, which had proportional results in their pre-test results, were found to have a statistically significant difference in their post-test results. Accordingly, the study concluded that supporting student-network with the five principles of cooperative learning has a positive effect on students' academic achievement. To this end, the study recommends that schools need to follow and support their student-network with the five principles of cooperative learning to better improve students' academic achievement.

Keywords: *Achievement, Cooperative learning, Student-network.*

[1] *Corresponding Author*

Introduction

Students' academic achievement is the result of many factors such as teachers and school contexts (Rivkin, Hanushek, & Kain, 2005), socioeconomic status (White, 1982), parental involvement (Fan & Chen, 2001), learner self-regulation (Zimmerman, 1990), and learners' academic emotions (Pekrun, Goetz, Titz, & Perry, 2002). Equally important to these factors, teaching and learning methods have also considerable contribution to students' academic achievement. Accordingly, teaching methods have been a potential field of research and publications. One of these methods that affect students' academic achievements, for example, is cooperative learning (Johnson & Johnson, 2009).

Cooperative learning implies to the method where students of different academic achievement and sex support each other on the bases of teams. It has a plethora of classifications and types: formal, informal and cooperative base group (Johnson & Johnson, 2009), student team achievement division (Majok, Dad, & Mahmood, 2010), structural approach (Kagan, 1985), Teams-games-Tournament (DeVries & Edwards, 1973), and circles of learning (Johnson, Johnson, & Holubec, 1994). However, regardless of these faming and labeling schemes, cooperative learning is practiced across different educational systems with different names of which 'student network' is amongst others.

The student-network is one of the teaching methods introduced to all educational levels starting from upper primary schools in Ethiopia. Therefore, the study was undertaken to investigate whether supporting student-network with the acclaimed principles of cooperative learning affects students' academic achievement or not.

Statement of the Problem

The student-network was introduced to the Ethiopian education system to improve the social and academic development of students. It shares similarities with the cooperative base group (see Reda & Hagos, 2015) where students of different academic achievement teamed together to support each other for a relatively extended period of time and with stable memberships (Johnson & Johnson, 2009). As the structures in the cooperative base group, the student-network contains six students: one student from the high achiever ('A' group students), two from medium achievers ('B' group students) and the remaining three from the lower achieving students ('C' group students). High achieving students ('A' group students) are those students with an average score of 86% and above, whereas the medium achiever group of students ('B' group students) are students with an average score ranging from 75% to 85%, and the remaining group of students ('C' group students) are with average score below 74% (Tigray Region Education Bureau, 2011).

The classification of students into these different categories is done on the basis of the students' previous year/semester average achievement. However, when the students' academic achievements in a certain network group changes and when these changes fail to

satisfy the composition criteria of members, teachers may reshuffle or create new network groups.

The network group, once the network group is made , is used for activities within and outside of the classrooms (Reda & Hagos, 2015). Within the classroom, students sit in their network groups and support each other on learning activities given by teachers. Students are also expected to meet once, twice or thrice in a week to support each other outside their regular classroom schedules. The content about which students support each other are prepared by subject teachers. While giving the activities, teachers are expected to provide guidelines how these students should complete the network-based learning activities and how individuals´ participation could be maintained. Teachers are also expected to monitor, assess and provide feedback to students following the network activities. The success of the networked group performance is seen in terms of individuals and group academic improvement. Consequently, groups with higher improvements are awarded both in class and school levels (Tigray Region Education Bureau, 2011).

However, unlike cooperative learning, the literature on the student-network seems to be limited. In fact, Reda & Hagos (2015) have studied the extent to which student-network is practiced in line with the principles of cooperative learning. Their study revealed that the student-network is meagerly practiced in line with the five basic principles of cooperative learning namely positive interdependence, individual accountability, individual interaction, group processing and interpersonal skills. In addition, the researchers found out that the practice of the student network is entangled with challenges related to teachers, students, school administration at its formulation, processes and evaluations (Reda & Hagos, 2015). Consequently, further study was recommended by the researchers to validate the effects of the students' network on students' academic achievement. Because, as to the observation of Reda & Hagos, although student-network remained a cannon strategy to enhance students' learning in Ethiopia, the issue suffers from a dearth of research that examines its effect on students' academic achievement. At least to the knowledge of the researchers, most of the anecdotal evidences about the effects of students' network are seemingly generated by equating student-network with cooperative learning other than approaching the student-network directly. To mention some research works on cooperative learning that tinker the attention of educational practitioners on the effects of student-network are: Alijanian, 2012; Cline, 2007; Keramati, 2014; Khan & Inamullah, 2011; Majok, et al., 2010; Slavin & Karweit, 1984; Thomas & Nair, 2013; Wyk, 2010, 2012; Yahoubi-Notash & Sarbakhshin, 2014; and Zakaria, Solfitri, Daud, & Abidin, 2013.

Therefore, studies that pursue the effects of student's network are important both to the improvement of student-network practices and discussions on cooperative learning. Practically, such studies may help to improve the establishment, processes and evaluations of the student-network in the Ethiopian schools. It may also help to cement practitioners' understanding about the effects of student's network on student's academic achievement. In addition, studies on cooperative learning (i.e., the student-network) may help to further improve scholarly discussion on cooperative learning from different contexts and

innovations. Thus, considering the indicated research gap and relevance of the student-network to students' academic achievement, the study was undertaken to address the following research question: "Does supporting student-network with the five principles of cooperative learning affect students' academic achievement?"

Objectives of the study

The general objective of the study is to demonstrate the effect of student-network to students´ academic achievement.

Specific Objectives

1. To test to what extent the student-network supported by the five principles of cooperative learning affects students' academic achievement.
2. To examine the effect of student-network supported by the five principles to the academic achievement of students across different subjects.

Research Design and Methodology

Research Design

Quasi-experimental research design was employed to address the research question. Quasi-experimental design, despite its limitations related to randomizations, is important in educational context. Following is a context where quasi-experimental design can be employed:

> In school situations, it is sometimes practically not possible to upset class schedules, to gather subjects for obtaining a sufficiently large sample or to organize classes in order to employ randomization procedures for getting equivalent control and experimental group. Under these circumstances, therefore, an experimenter may use pre-assembled groups or may apply quasi experimental design such as intact classes, for framing experimental and control groups (Koul, 2006, p. 500).

As indicated by Koul, the quasi-experimental design is applied to assign intact or pre-existed groups into treatment and comparable groups. However, as with the true experimental research design, it helps to test the effects of the independent variable on the dependent variable by having a comparable and treatment group, in which the treatment group receives treatments of the independent variable while the comparable group is not (Bryman, 2008).

Hence, the quasi-experimental design was, therefore, used because it was difficult to assign students into the treatment and comparable groups through randomization. Accordingly, supporting the students-network with the five principles of cooperative learning was taken as independent variable and the student's academic achievement as dependent variable and thus the effects of independent variable on students' academic performance (dependent variable) has been investigated by having treatment and comparable groups.

The treatment group has received additional support and trainings on the five principles of cooperative learning while the students in the comparable group did not. In other words, students in the comparable group were left untrained/untouched. Cognizant of this, the research has also employed a quantitative research approach to collect and analyze data. The quantitative research approach involves the quantifications of traits (Bryman, 2008) and is more applicable in the experimental research designs (Koul, 2006).

Target of the Study and Participants

The study was targeted on upper primary and general secondary school students. According to the Ethiopian education system, primary education includes grades one to eight and secondary education includes grades from nine to 10+2. Each educational cycle has two tires. The primary school contains lower primary (grade one to four) and upper primary (grades five to eight). Similarly, the secondary education cycle contains general secondary (grade nine and ten) and preparatory (grades 10+1 and 10+2). Accordingly, the study targeted on students of upper primary, and general secondary schools. The main reason to select these two cycles was because the students' network is practiced above the upper primary schools.

Sample and Sampling procedure

The study was conducted in Tigray Regional State (one of the regional states in the Federal Democratic and Republic of Ethiopia) in 2016. Accordingly, both probability and nonprobability sampling were used to select participants of the study. In so doing, first, one zone (south eastern zone) was selected using a convenience sampling method from the available seven zones in the region. And then, one town (Adigudom) was selected using the same sampling technique. Following this, one upper primary school (Hawatsu) out of the seven primary schools in the town and one general secondary (Adigudom Secondary School) were selected using lottery and purposeful sampling method, respectively. Then after, grade seven from the upper primary school and grade nine from the secondary school were selected through a lottery and purposive sampling method, respectively.

Purposive sampling technique was employed to select grade nine because students of the remaining grade level (i.e., Grade Ten) were under preparations for the General School Leaving Certificate Examination (EGSLCE) and hence was difficult to administer experimental treatment to the group. Therefore, once the grade levels were selected, pre-test exams were administered in three subjects (Physics, English and Mathematics). The pretest exams were administered to be taught by the same teacher. Finally, two sections with proportional mean test result in the pre-test exam were randomly assigned in the treatment and comparable group.

Treatment procedures

As indicated in the preceding sections, the research was initiated to examine the effect of student-network, supported by the principles of cooperative learning on students' academic

achievement. Accordingly, the following procedures were followed to address the research question.

First, consultative discussions were held with principals and teachers of the selected schools. The discussion was held whether the student-network exercised in the selected schools is practiced in line with the five cooperative learning principles or not. Accordingly, it was pointed out that the student-network was practiced without following the five principles of cooperative learning. This was also supported by classroom observation while the students were making classroom group discussion on the basis of their network groups. The network discussions were dominated by one or two students and most of the students in the network groups were listening passively. Furthermore, reviewed documents also indicate that student-network practice lacks proper and appropriate support of the five principles of student-network.

Second, grade levels for the treatment and comparable groups were selected. That is, as indicated above, grade seven from Hawatsu Primary School and grade nine from Adigudom Secondary School were selected. After selecting these grade levels, observations were again made while the students were making discussions on their network groups and thus was understood that the student-network activities were not performed in line with the five principles of cooperative learning. Accordingly, it was grasped that the principles of cooperative learning were not integrated into the students' network.

Thirdly, pre-test exams in Mathematics, English and Physics were prepared and administered to all sections of the selected grade levels that were taught by the same teacher for the indicated subjects. The pre-test exams were prepared by experts and were prepared from the contents covered before the consultation periods. The prepared tests were piloted in Mekelle University Community School and the reliability of the pilot test for each subject is indicated in the table below. The reliabilities of the tests were checked through split half method.

Table 1. Reliability of Piloted Pre-test

Grade	Subjects	Number of students	Number of Questions	Reliability		No. of omitted Items	Final Items (After adjustment)
				Before adjustment	After adjustment		
Nine	English	20	20	0.0013	0.6	9	11
	Mathematics	20	20	0.759	-	0	20
	Physics	20	20	0.002	0.65	10	10
Seven	English	35	20	0.0018	0.623	4	16
	Mathematics	35	20	0.684	-	0	20
	Physics	35	20	0.679	-	1	19

- No adjustment was done

In addition, difficult questions that did not match to the capacity of the students were removed to improve the content validity and reliability of the test. Accordingly, nine questions from grade nine Mathematics test, ten questions from grade nine Physics test, four

questions from grade seven English test and one question from Physics grade seven tests were excluded after the pilot test.

Fourthly, the prepared pre-test exams, after checking their validity and reliability, were administered to three sections of grade nine and three sections of grade seven. Accordingly, two classes that have proportional academic performances in the pre-test were randomly assigned into the comparable and treatment groups. The pre-test results of the selected grade levels are indicated here below.

Table 2. Comparison of Mean Test Results (pre-test)

Grades	Sections	t	df	Sig. (2-tailed)	Mean Difference
Grade Seven	A and B	5.19	77	0.00*	1.28
	A and C	5.19	77	0.00*	1.283
	C and B	-0.065	73	0.948	-0.024
Grade Nine	A and C	0.992	53	0.326	0.259
	A and D	-0.639	65	0.525	-0.146
	C and D	-1.829	62	0.072	-0.405

*P<0.05

Table 2 depicts mean difference among different sections. It reveals that the mean differences between sections in grade seven were not significant between sections 'C' and 'B'. On the contrary, the mean difference among all sections of grade nine was found not significant. Accordingly, the two sections (section C and B) in grade seven were randomly assigned into treatment and comparable groups. However, as the differences among grade nine sections were not significant, two sections (that is C and D) were randomly selected and then were assigned into comparable and treatment groups randomly.

Fifthly, the treatment groups of both grade levels have received treatment of the independent variable. That is, the students in the treatment groups were provided three-day training on the five principles of cooperative learning. The training was supported with exercises that help to understand the applications of each principle in their network activities. Following this, the experimental groups of each grade level were again given support on the applications of the five principles of cooperative learning in their actual network discussions. This was done for about three weeks. In contrast to the treatment group, the student networks in the comparable groups have not received any of the indicated treatments.

Sixthly, post-tests were administered to both treatment and comparable groups of both grade levels. To minimize the effect of pre-test sensitization - a threat of improved performance in post-test that results from experiences of the pre-test (Gay, Mills, & Airasian, 2009), the pre-test and post-tests were made differently, but with comparable number of items and types. The post-tests, as with the pre-tests, were prepared by experts and their reliability and validity of the instruments were checked. As with the pre-tests, the post-tests were given at similar times for both treatment and comparable groups. In addition, the post-tests were developed from the covered contents of each subject.

Techniques and Procedures of Data Analysis

Data collected through tests were analyzed quantitatively using inferential statistics and line graphs. That is, independent and paired sample t-tests were employed to analyze the mean differences among the treatment and comparable groups and within group differences, respectively. In other words, the independent sample t-test was used to see the differences on the effects of student-network, supported by the principles of cooperative learning on students' academic achievement between the treatment and comparable groups. In addition, the paired t-test was employed to identify the differences between the experimental and comparable groups (within) in the two events: pre and post-tests periods.

Results

This section presents the results of the study. It particularly presents the mean difference between the comparable and treatment groups of both grade levels. In addition, as it is important to understand whether there were improvements in the treatment groups, within group comparisons were also presented. The comparison within these groups stipulates the mean results of both treatment and comparable group during the pre and post-tests, independently.

Achievement Mean Differences between Treatment and Comparable Groups

This section examines the achievement mean differences between the comparable and treatment groups of both grade levels.

Table 3. Achievement Mean Differences between treatment and comparable groups (grade seven and grade nine)

Grade	*Group*	*N*	*Mean*	*Sd*	*t*	*df*	*Sig. (2-tailed)*
Seven	Comparable	21	6.74	2.120	-2.17	47	.035*
	Treatment	28	8.49	3.198			
Nine	Comparable	21	5.57	2.59	-6.56		
	Treatment	35	9.84	2.20		54	.000*

*P<0.05

Table 3 shows the mean differences of grade seven and nine students' test score between treatment and comparable groups. Accordingly, it shows that the mean academic achievement of the treatment group in grade seven (the group that receives treatment) was found higher than the group that did not receive any treatment on the principles of cooperative learning. It is observed that the mean test results of the comparable group and treatment group in grade seven were found to be 6.74 and 8.49 respectively. Similar results were also observed in the treatment and comparable groups in grade nine. As indicated in Table 3, the mean test result of the comparable and treatment group in grade nine was found to be 5.57 and 9.84 respectively. That is the mean test result of the treatment group in grade nine was found higher than the mean test result of the comparable group. In sum, the mean

test result of the treatment and comparable groups of both grade levels was found higher in the treatment group than the comparable groups. And, the difference between the comparable and treatment groups for both grade levels was found to be statistically significant *(for grade seven t=2.17, df=47, P<0.05; for grade nine t=6.57, df=54, P<0.05).*

This implies that, keeping other things constant, the result of the treatment group comes to be higher than the comparable group due to the employed treatments. That is, the training on the five principles of cooperative learning and support provided to integrate the five principles into the student-network activities may affect students' academic achievement to be higher than those that did not receive any treatments.

Academic Achievement Mean Difference Comparisons (Within group)

A comparison within each group was undertaken in order to understand whether the comparative and treatment group have mean difference both before and after the treatment periods.

Table 4. Academic Achievement Mean Difference Comparisons (Within group) for Grade Seven and Nine

Grades	*Group*	*Conditions*	*Mean*	*N*	*Sd*	*t-test*	*Df*	*Sig. (2-tailed)*
Seven	Comparable	Pre-test	6.43	21	1.07	-.766	20	.453
		Post-test	6.74	21	2.12			
	Treatment	Pre-test	6.65	28	1.87	-3.22	27	.003**
		Post test	8.49	28	3.19			
Nine	Comparable	Pre-test	2.84	19	.781	-4.5	18	.00**
		Post-test	5.04	19	1.95			
	Treatment	Pre-test	3.30	32	.86	-14.7	31	.00**
		Post-test	9.83	32	2.25			

*P<0.05

Table 4 shows academic achievement mean difference between groups of comparable and treatment of both grade levels. It shows the comparable and treatment group mean academic achievement differences in the two testing periods: pre and post-test events. Accordingly, the mean test result of the comparable group in grade seven has shown slight difference. It seems that the mean academic achievement of the comparable group has shown slight increment in the post-test (Mean=6.74) than the pre-test (Mean=6.43) results. However, the mean difference between the pre and posttest for the seventh-grade comparable group was not statistically significant.

In addition, Table 4 shows the academic achievement mean differences for the treatment group of both grade levels. Accordingly, as with the grade seven comparable groups, the comparable group of the seventh grade has shown slight increment in its mean test result. It has increased from mean of 6.65 in the pre-test to mean of 8.49 in the post-test. Accordingly, unlike the comparable groups in the seventh grade, the difference in the comparable group academic achievement differences is found to be statistically significant *(t=3.22, df=27,*

P<0.05). This implies that the employed intervention in the treatment group has created differences of the students' mean test result in their pre and post treatment conditions.

Moreover, the Table 4 shows academic achievement mean difference between treatment and comparable group of grade nine. As indicated in the table, the comparable and treatment groups of grade nine have shown slight increment in their test mean results and in their post-test results. That is, students in the comparable group of grade nine, even if they did not receive any treatment, have shown improvement in their post-test mean test results. The academic achievement mean for the comparable group has increased from mean of 2.84 (pre-test) to mean of 5.04 (post-test) and the difference between the two test mean results was found to be statistically significant ($t=4.5$, $df=18$, $p<0.05$). Similar findings are also observed in the case of the ninth-grade treatment groups. That is, the mean test result of the treatment group for the pre and post-test has shown slight differences. And, the differences seem to be statistically significant ($t=14.7$,$df=31$,$p<0.05$). However, although there was increment in mean test result of both groups, the mean test result difference in the treatment group seems to be higher than the comparable group.

In general, Table 4 implies that the treatments in grade seven were effective in bringing students' academic achievement differences than in grade nine. The comparable groups in grade nine, unlike the comparable group in grade seven, have shown better improvement in their academic achievement after the treatment periods.

Mean Test Result across Subjects and Groups

This section attempts to compare the mean test result of the comparable and treatment groups across the selected subjects.

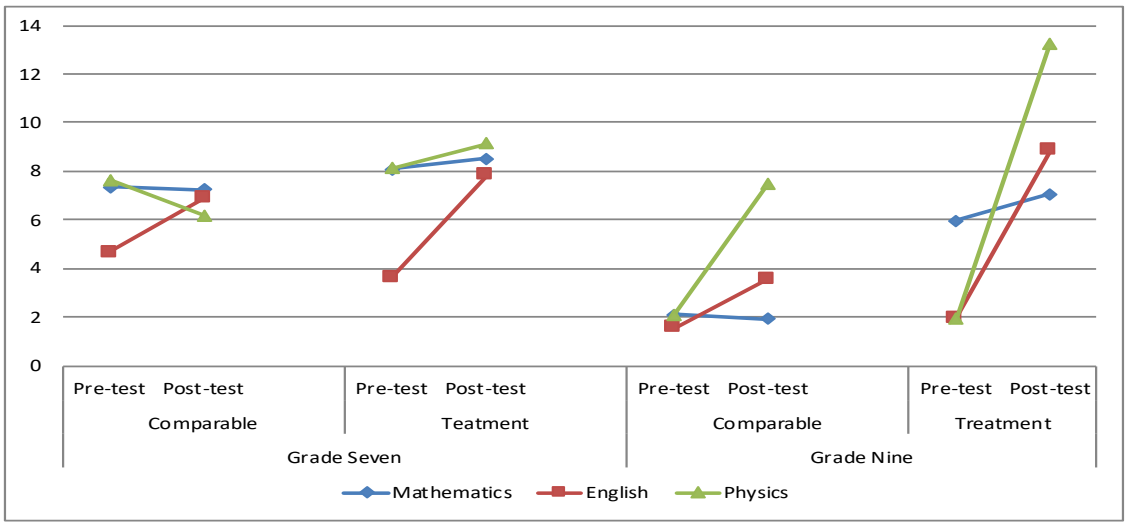

Figure 1: Mean test result across subjects and groups (grade seven and nine)

Figure 1 shows the increase in the mean test achievement results of both comparable and treatment groups of both grade levels. In the cases of grade seven, there seems to be steady increment in the mean test results of both groups: the treatment and comparable groups.

Unlike the increment in the mean test results of the subjects (English and Mathematics) in the post-test conditions, the comparable group result of Physics has declined. Somehow different trend is observed in the treatment group of the seventh grade. Figure 1 generally depicts an increase in students' academic achievement in all subjects, but with a remarkably steady increment in English.

Moreover, figure 1 reveals the mean test result differences of grade nine students in the two testing periods: pre- and post-test. Accordingly, it reveals that the comparable group in grade nine has increased its mean test result from the pre-test to the post-test periods. But this seems different form the group's result in Mathematics. Similar trend is also observed in the cases of mean test results of the treatment group across the two periods: pre and post-test. As indicated in Figure 1, the mean test result of students in the treatment group has increased in the post-test period. And this seems common to all subjects, but with variation in increment. The increment in Mathematics mean test results seems to be smooth whereas the increment in the case of English and Physics seems to be steady. Accordingly, one may infer that the effect of the treatment on students' academic achievement seems to be higher in grade nine Physics and English subjects than Mathematics.

Discussions

The study was initiated to test the effect of student-network supported by the five principles of cooperative learning on students´ academic achievement. Accordingly, it was found out that supporting students' network with five principles of cooperative learning has positive effect on students' academic achievement. The treatment groups of both grade levels were found having higher mean test results compared to their counter comparative groups. Therefore, the findings seem to be consistent with previous findings on the effects of cooperative learning on students' academic achievement (Seid, 2012; Susan, 2007; and Zakaria, Chin, & Daud, 2010).

The findings also seem consistent with the theory of cooperative learning. According to the theory of cooperative learning, students can support each other to improve their learning and academic achievement. More specifically, the theory states that working together is more efficient and important than working alone. In the cooperative learning, students are able to learn from each other, utilize each other's skill and resources, and share experiences that may benefit the entire group. Doing so has, therefore, contributed to students' academic and social skill developments. However, according to the theory of cooperative learning, a simple grouping and dragging students to sit together may not guarantee students' academic achievement (Huss, 2006). Cooperative learning is beyond sitting and being together. It is meaningful when positive interdependence, face to face cooperation, individual accountability, group processing, and interpersonal skills of the group members existed. "When a learning process contains all the principles of cooperative learning, we can interpret it as structured as a cooperative one" (Ferenc, 2013, p. 66). Therefore, the findings have evidenced that supporting student-network with the five principles of cooperative learning (as

it is also deemed to be exercised (see, Reda & Hagos, 2015)) has an effect on students' academic achievement of different subject areas: Mathematics, English and Physics.

Furthermore, previous studies on the practice of student-network have declared that the student network, despite it is assumed to be practiced in line with the principles of learning; its practice as it is evaluated against the five principles of cooperative learning was meager (Reda & Hagos, 2015). Therefore, this might lead to question whether or not supporting student-network by the principles of cooperative learning would have an effect on students' academic achievement. Cognizant of this, the findings of the study seem to fill the gap about which the earlier researchers have posed. That is, the present findings proved that supporting the student-network with the five principles of cooperative learning has positive effect on the student academic achievement.

Moreover, the findings of the present study seem to have direct implications to the practices of the student-network in Ethiopia. The findings give the message that the student network, if properly supported with the five principles of cooperative learning, could evidently help to improve students' academic achievement-an issue that has been at stake in the public and academic discussions (MoE, 2015). Students' learning and academic achievement, as it is also common to other developing countries (see UNESCO, 2013), is at stake in Ethiopia too. For example, the study on early grade assessment in Ethiopia revealed that 34% of students in grade two were unable to read a single word of a grade level relevant story; 48% of students were unable to answer a single comprehension question on a reading comprehension test; and only 5% of students were able to reach 60 words per minute in reading fluency (the then expected standard) (MoE, 2015, p. 15). Moreover, greater than 50 % of the students in grade ten and 10+2 have performed below the national minimum standard which is 50% in the basic subject areas such as Physics, Mathematics, English, Chemistry and Biology in the national learning assessment (National Educational Assessment and Evalaution Agency-NEAEA, 2010). Therefore, as student-network was introduced to lift students' academic achievement, supporting it with the five principles may strengthen its effects on students' academic achievement.

Conclusions

Positive interdependence, individual accountability, individual interaction, group processing and interpersonal skills are the five principles of cooperative learning. These factors determine the effects of cooperative learning to students' learning. In the same vein, the integration of these principles into the student-network contributes to students' academic achievement. Consequently, it is fair to conclude that supporting student-network with the five principles of cooperative learning helps to improve students' learning and thereby quality education in Ethiopia. Therefore, on the basis of the observed results, the following recommendations are forwarded. These are:

- Teachers and principals need to properly and efficiently integrate the five principles of cooperative learning to the student-network in order to solidify its effect on students' academic achievement.

- Students need to be equipped with the five principles of cooperative learning so that they can undertake their student-network activities following the principles.
- Schools should get support and guideline packages regarding the integrations and applications of the five principles of cooperative learning to student-network so that they could practice them in their student-network precisely.

Finally, it is of important to note that the study, due to the incomparable number of female and male students in the selected treatment and comparable group, was not able to extend the analysis to examine whether sex differences exist between the results of treatment groups. In addition, as the present study employed quasi-experimental design, it is difficult to draw complete causation between the employed independent variable (student-network supported with the five principles of cooperative learning) and dependent variable (students' academic achievement). Therefore, it is important to conduct further research that would address these limitations.

Cite this article as:

Reda, N. W., Hagos, T. G., Gebre-eyesus, M. T., & Weldie, S. F. (2019). Supporting "Student-Network" with the Principles of Cooperative Learning: Effects and Implications. *Journal of Educational and Behavioral Sciences*, *2*(1), 48–61

References

Alijanian, E. (2012). The Effect of Student Teams Achievement Division Technique on English Achievement of Iranian EFL Learners. *Theory and Practice in Language Studies, 2*(9), 1971-1975

Bryman, A. (2008). *Social Research Methods* (3rd ed.). New York: Oxford University Press.

Cline, L. (2007). Impacts of Kagan Cooperative Learning Structures on Fifth-Graders' Mathematical Achievement. San Clemente, CA: Kagan Publishing. Kagan Online Magazine, Fall 2007. www.KaganOnline.com.

DeVries, D, & Edwards, K. (1973). Learning Games and Student Teams: Their effects on classroom process. *American Educational Research Journal, 10*, 307-318.

Fan, Xitao, & Chen, Michael. (2001). Parental Involvement and Students' Academic Achievement: A meta-analysis. *Educational psychology review, 13*(1), 1-22.

Ferenc, A. (2013). Towards a Complex Model of Cooperative Learning. *Da Investigação às Práticas, 3*(1), 57-79.

Gay, L M, Mills, G E, & Airasian, P. (2009). *Educational Research: competencies for analysis and applications* (9 ed.). New Jersey: Pearson Education inc. .

Huss, J A. (2006). Gifted Education and Cooperative Learning: a miss or a match? *Gifted Child Today, 29*(4), 19-23.

Johnson, D W, & Johnson, R T. (2009). An Educational Psychology Success Story:Social Interdependence Theory and Cooperative Learning. *Edcational Researcher, 38*(5), 365–379.

Johnson, D W, Johnson, R T, & Holubec, E J. (1994). *The New Circles of Learning: Cooperation in the Classroom and School*. Alexandria: Association for Supervision and Curriculum Development.

Kagan, S. (1985). *Cooperative Learning Resources for Teachers. Riverside: University of California at Riverside*.

Keramati, M R. (2014). Effect of Student Team Achievement Division (STAD) on Academic Achievement of Undergraduate Psychology Students. *International Journal of Education and Applied Sciences, 1*(1), 37-47.

Khan, G N, & Inamullah, H M. (2011). Effect of Student's Team Achievement Division (STAD) on Academic Achievement of Students. *Asian Social Science 7*(12), 211-215.

Koul, L. (2006). *Methodology of Educational Research* (3 ed.). New Delhi: VIKAS Publishing house PVT.ltd.

Majok, M I, Dad, M H, & Mahmood, T. (2010). Student Team Achievement Division (STAD) as an Active Learning Strategy:Emprical Evidence from Mathematics classroom. *Journal of Education and Sociology*, 16-20.

MoE. (2015). *Education Sector Development Program V (ESDP V) 2008 - 2012 E.C (2015/16 - 2019/20 G.C)*. Addis Ababa.

NEAEA. (2010). Ethiopian First National Learning Assessment of Grades 10 and 12 Students: Addis Ababa-Ethiopia.

Pekrun, Reinhard, Goetz, Thomas, Titz, Wolfram, & Perry, Raymond P. (2002). Academic Emotions in Students' Self-regulated Learning and Achievement: A program of qualitative and quantitative research. *Educational psychologist, 37*(2), 91-105.

Reda, Weldemariam Nigusse, & Hagos, Girmay Tsegay. (2015). The Practices of Student Network as Cooperative Learning in Ethiopia. *Africa Education Review, 12*(4), 696-712.

Rivkin, Steven G, Hanushek, Eric A, & Kain, John F. (2005). Teachers, schools, and academic achievement. *Econometrica, 73*(2), 417-458.

Seid, Mohammed. (2012). *Effects of Cooperative Learning on Reading Comprehension Achievement in EFL and Social Skills of Grade 10 Students.* Thesis for the Doctor of Philosophy (Teaching English as a Foreign Language) (Unpublished), Addis Ababa University, Addis Ababa.

Slavin, R E, & Karweit, N. (1984). "Mastery Learning and Student Teams: A Factorial Experiment in Urban General Mathematics Classes", *American Educational Research Journal*, Vol. 21, No. 4, pp. 725-736.

Susan, B. (2007). *The Effects of Cooperative Learning on Learning and Engagement.* Master Degree in Teaching, Evergreen State College (unpublished). Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download

Thomas, S, & Nair, S N. (2013). Effectiveness of Student-Team Achievement Division (STAD) on the Enhancement of English Language Competency among Students at Secondary level. *Conflux Journal of Education 1*(*2*), 23-26.

Tigray Region Education Bureau. (2011). Manual for the Formulation of Student Network.[brochure] Mekelle_Ethiopia [unpublished Draft].

Umeh, M, & Fidelia, N. (2009). Co-operative Learning Approach and Students' Achievement in Sociology. *International Multi-Disciplinary Journal, Ethiopia 3*(3), 388-398. Retrieved from http://www.ajol.info/index.php/afrrev/article/viewFile/47538/33915

UNESCO. (2013). Toward Universal Learning: A Global Framework for Measuring Learning *Learning Metrics Task Force* . UNESCO

White, Karl R. (1982). The Relation Between Socioeconomic Status and Academic Achievement. *Psychological bulletin, 91*(3), 461-481.

WorldBank. (2011). Learning for All: Investing in People's Knowledge and Skills to Promote Development *World Bank Group Education Strategy 2020*. Washington DC.

Wyk, M M V. (2010). Do Student Teams Achievement Divisions Enhance Economic Literacy? An Quasi-experimental Design. *Social Science . 23(2),83-89*

Wyk, M M V. (2012). The Effects of the STAD-Cooperative Learning Method on Student Achievement, Attitude and Motivation in Economics Education. *J Soc Sci, 33*(2), 261-270.

Yahoubi-Notash, M, & Sarbakhshin, B. (2014). Cooperative learning for Oral Accuracy: Investigating inflectional ending pronunciation in EFL situation. *Journal of Language and Literature Education, 10*, 41-57.

Zakaria, E, Chin, L C, & Daud, Y. (2010). The Effects of Cooperative Learning on Students' Mathematics Achievement and Attitude towards Mathematics. *Journal of Social Sciences, 6*(2), 272-275.

Zakaria, E, Solfitri, T, Daud, Y, & Abidin, Z Z (Producer). (2013). Effect of Cooperative Learning on Secondary School Students' Mathematics Achievement. *Creative Education.4(02).98-100*

Zimmerman, Barry J. (1990). Self-regulated learning and academic achievement: An overview. *Educational psychologist, 25*(1), 3-17.