

The Effectiveness Of Cooperative learning Strategy At Omani Schools

Dr. Ahmed Y. Abdelraheem

College of Education
Sultan Qaboos University
Sultanate of Oman

Zahia N. Al-Shekaily

Ministry of Education,
Sultanate of Oman

Abstract

The aim of this study was to determine the effects of the cooperative learning strategy as a process technology on the achievement of content knowledge, retention, and attitudes toward cooperative learning strategy. Cooperative learning strategy was compared to traditional learning classroom structure using a quasi-experimental design. An achievement test, and an attitude questionnaire were administered immediately following instruction on the unit of rational numbers. A retention test was administered three weeks following the achievement test. Pretest scores in mathematics were used to show if there were differences between the two groups. T tests showed no significant difference among the dependent variables (achievement and retention) between the teaching methods used. There was also a significant difference in students' attitudes toward cooperative learning strategy.

Introduction:

As known, technology is not only hardware. It includes both processes and products. Educational technology consists of both process technology and audiovisual materials. Most educators consider educational technology as the use of audiovisual materials in teaching and neglect the process of designing these audiovisual materials. By this view, they limit themselves in a narrow area. Heinich, Molenda, and Russell (1989) define technology of instruction as "*a teaching/ learning pattern designed to provide reliable, effective instruction to each learner through application of scientific principles of human learning*" (p.306). Later, Heinich, Molenda, Russell and Samaldino (1999) changed the

term to process technology and technologies for learning as the shift has taken place from instruction to learning and construction. Among these process technologies is cooperative learning.

The general concept of cooperative learning may be used as the basis for specific technology of instruction (process technologies). Slavin's (1991) Students Teams-Achievement Divisions (STAD) is a good example for that because it is a structured teaching/ learning pattern aimed at improving individual learning while cultivating desirable social objectives through the application of psychological principles. In cooperative learning strategy, potential social isolation, which is a major criticism for technologies of instruction, could be solved through the interaction among the group of learners in an effective way (Heinich et al., 1999).

Educators recognize three ways of organizing teaching; competitively, individualistically, or cooperatively (collaboratively). The way by which lessons are organized can influence students' interactions with others, knowledge, and attitudes (Carson, 1990; Johnson & Johnson, 1987). In a competitively structured classroom, students work in a win-lose struggle in an effort to determine who is best (Johnson & Johnson, 1991). Students in independently (individualistically) structured classrooms work by themselves to accomplish goals unrelated to those of the other students (Johnson & Johnson, 1991). In a cooperative learning classroom students work together to attain group goals that cannot be obtained by working alone or competitively. In this classroom environment, students discuss subject matter, help each other learn, and provide encouragement for other members in the group (Johnson, Johnson, & Holubec, 1986).

According to Foote (1997), cooperative learning refers to small-group instruction that incorporates five elements: clear, positive interdependence among students; group self-evaluation; interpersonal behaviors that promote each member's learning; individual accountability; and frequent use of small-group social skills. Systematically structuring those basic elements into group learning situations helps ensure cooperative efforts and enables the disciplined implementation of cooperative learning for long-term success.

Cooperative learning is one of the most fruitful and fertile areas of theory, research, and application in education. Cooperative learning

exists when students work together to achieve common learning goals. Each student can then achieve his or her learning goal if, and only if, the other group members achieve theirs ((Deutsch, 1962; Johnson & Johnson, 1989).

Literature review:

Singhanayok & Hooper (1998) investigated the effects of studying alone or in cooperative-learning groups on the performance of high and low achievers, using either learner- or program-controlled computer-based instruction. Participants were 92 sixth-grade students. Results suggest that cooperative learning provides beneficial effects. Yu (1998) studied the relative effects of cooperation with and without inter-group competition on Taiwanese students' academic achievement in science and their attitudes toward science in a computer-assisted instruction environment. He found that there was a positive attitude towards teaching method, and there was no significant difference between cooperation with and without inter-group competition. Crooks & Klein (1996) investigated the effects of cooperative instruction, individual instruction, and learner control of instructional elements (practice items, summary material, review material) on 128 undergraduate students' test performance, attitudes, option use, and student interactions and found that posttest performance was not influenced by either learner control mode or instructional method. Johnson (1984) compared cooperative learning strategies with the traditional method for 150 eight grades students with regard to their abilities in solving mathematics problems. No significant differences have been appeared between the two methods. Bard (1996) discussed the use of cooperative learning activities in interactive distance learning classes at the University of Hawaii, School of Library and Information Studies. Topics include dyad and small group discussions, group projects, evaluating cooperative learning on interactive television, effect on academic performance, students' evaluation, and monitoring cooperative learning activities. He found positive results in favor of cooperative learning when compared with traditional teaching methods. Pomplun (1996) described results for students with mild disabilities who participated in the Kansas Science Assessment involving cooperative groups. Individual achievement, attitude, and project scores were consistent with expectations in relation to results for

general education students. He found that disabilities had negative effects on group performance. Cooperative learning, as an instructional strategy provides opportunities for students to develop skills in group interactions and in working with others that are needed in today's world (Carol, 1988; Imel, 1989; Kerka, 1990; Johanning, 2002). According to Johnson and Johnson (1989), cooperative learning experiences create more positive attitudes toward the instructional experience than competitive or individualistic methods. In addition, cooperative learning leads to positive effects on student's achievement and retention of information (Dishon & O'Leary, 1984; Johnson & Johnson, 1990; Slavin, 1991, Cavalier, Klein & Cavalier, 1995). Felder (2001) found evidence from several studies which show significant increases in learning, skill development, and confidence due to the proper implementation of active and cooperative methods. Whereas Foote (1997) mentioned that Kansas Community College carried out a study of collaborative sociology and psychology courses, findings showed no significant differences between grades of 50 students in collaborative courses, and 100 in traditional classes. Putnam (1998) found that in 323 studies comparing cooperative learning with other methods, 40% showed no significant differences between cooperative learning and other methods, 50% showed significant differences in favor of cooperative learning and 10% were in favor of individualized instruction. All of the above discussed studies are carried outside the Arab world. Studies and research in cooperative learning in mathematics in the Arab world were dealt with as well. Hassan (2001) carried out a study in Egypt (Assuit) on a sample of 82 fifth graders and found that cooperative learning was effective in mathematics learning, retention of mathematics facts and deductive thinking. In addition, Hassan found a strong positive correlation between achievement, retention and deductive thinking. Alsharif (2000) found that cooperative learning strategy improved learning in normal students and also in those who have difficulties in learning. Alzaghlol and Abainah (1998) compared two methods of cooperative learning strategies in mathematics teaching in Jordan (Muttah) in seventh grade students. They found no significant differences between the methods of cooperative learning strategies. Abdulrahman (1996) studied the effects of cooperative learning strategies on achievement in geometry for seventh graders. He found that

students in cooperative learning strategy outscored their counterparts. Abuzeenah and Khatab (1995) found that Emarati students who used cooperative learning strategy in learning mathematics did significantly better than the other group who used traditional methods. Abdulrahman (1993), Noah (1993) reported positive results for cooperative learning strategy in achievement in mathematics when compared with traditional methods.

While collaborative learning, as a technology of instruction, may be considered as an effective teaching/learning pattern, meeting educational expectations depends upon proper process technology utilization and other factors.

Statement of the Problem:

While empirical evidence supports, to some extent, the use of cooperative learning with a variety of subject areas and age groups, the extent to which these methods are beneficial in mathematics education needs more investigation. This is because mathematics education is still heavily dependent on traditional teaching methods. The research findings on the effectiveness of cooperative learning strategies are inconclusive. Without practical research evidence to support the use of cooperative education in mathematics it is likely to be ignored as an instructional strategy by mathematics educators. It was observed that Omani students' achievement in mathematics was not up to the standards set by the Omani Ministry of Education (Almeqbaly, 2003). In addition, mathematics teaching methods at Omani schools are basically traditional ones in which the teacher is the center of the learning process and not the learner. Based on the above mentioned facts and to the researchers' best knowledge, this study is thought to be the first study in Oman in which cooperative learning strategy was implemented. Other studies at different Arab countries have been conducted and have shown positive results in favor of cooperative learning strategies. The purpose of the present study is to determine the effects of the cooperative learning strategy on the achievement, retention of mathematics information, and attitudes toward the instructional strategy of selected sample of second year preparatory female students in the Sultanate of Oman.

The following three questions were examined:

- Is there a significant difference in the achievement of students taught using the cooperative learning strategy and those taught using traditional method?
- Is there a significant difference in the retention of students taught using the cooperative learning method and those taught using traditional method?
- Is there a significant difference in the attitudes towards the teaching method used for students taught using the cooperative learning method and those taught using the traditional method?

Research Methods and Procedures:

The sample of this study consisted of 151 second year preparatory stage (eighth grade) female students in the Sultanate of Oman. Students' ages ranged between 14 and 15 years. Two schools from south of Althahrah region were randomly selected to participate in the study from a total of thirty-two schools. According to McMillan and Schumacher (1993, p.165) "in a comparative study the researcher should have at least fifteen subjects in each group". Thus, the sample size is enough for the purpose of the current study. The design was quasi-experimental with 76 students in the cooperative learning group and 75 students in the traditional method group. Two classes from each participating school were identified (one as control and the other as experimental), they were randomly assigned to cooperative and traditional method groups.

Tools:

In order to account for possible pre-existing differences in overall ability between the selected groups, a pretest scores in mathematics classes were used to show if there were differences between the groups. No significant differences were found (Table1). In order to control the teacher variable, both groups were taught by the same mathematics teacher. The Teacher was also provided by detailed instructions for conducting learning activities in both groups: the cooperative and traditional groups. Both groups of students were taught the rational number unit which consists of ten lessons, using the same content

outline, but students in the cooperative learning group completed learning activities in small heterogeneous groups (five students one high achiever, three average achievers and one low achiever), in order to have different ideas and suggestions. Students in the traditional group completed activities individually. The unit was taught to both groups in 22 class periods.

16-item multiple choice test was used to measure student achievement and retention. It was developed by the authors. Content validity of the items was assessed by mathematics teachers and faculty members from Sultan Qaboos University. Items related to each instructional objective were selected for the instrument. The instrument was pilot tested to establish reliability in a school not selected to participate in the study. The Kuder-Richardson coefficient of internal consistency for the test was 0.79. The test was administered to both groups at the end of the instructional unit. Three weeks later, the test was administered again to the students to determine retention of information. The instrument used to measure attitudes toward the method of instruction was developed by the researchers. Content validity of the attitude instrument was established by faculty members of the Sultan Qaboos University who had expertise in the development of attitude instruments. The instrument had a coefficient of internal consistency (Cronbach's Alpha) of .89. The attitude instrument was designed in a Likert-type survey scale. It was administered at the end of the unit.

Findings and Conclusions

Data analyses of pretest measures showed that students in the treatment groups were not significantly different on achievement (see Table 1) below.

**Table (1) T test for pretest scores on achievement
on math for the treatment groups**

GROUP	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	mean Difference
Control	76	75.55	14.98	-1.11	149	.271	-2.69
Experimental	75	78.25	14.97				

The above table shows that there is no significant difference between the two groups i.e. the two groups were equivalent before the experiment regarding their mathematics achievement.

To answer the first question of the present study which states "Is there a significant difference in achievement, as measured by achievement test, for students who were using the cooperative learning strategy and those who were using traditional methods?" Student achievement was measured by the number of correct responses on the 16-item achievement test developed by the researchers. The mean scores for the cooperative learning group was 11.54 while the mean scores for the traditional method group was 11.59 (see Table 2).

**Table(2) T test for posttest1 scores on achievement
on math for the treatment groups**

Group	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	mean Difference
Control	76	11.59	2.96	.101	148	.920	0.051
Experimental	74	11.54					

Table 2 shows that students in the treatment groups were not significantly different on their achievement on the posttest1 on math. This result came in line with the results of Crooks et al. (1996) and Johnson (1984) and could be justified by the fact that the students' level of cooperation was low and their interaction with each other were not at high level when the study was carried out regardless of teacher encouragement to do that.

Also, the control group did as well as the experimental group because they experienced the method (traditional teaching).

The second question of the study which states "Is there a significant difference in retention of information, as measured by the retention test administered three weeks after the end of instruction for students who were using the cooperative learning method and those who were using traditional methods?"

The test of retention (posttest2) was administered three weeks following the achievement test. The mean scores for the cooperative learning group on the retention test and the traditional group were 12.15 and 12.61 respectively (see Table 3).

Table (3)
T test for posttest 2 (retention) scores on achievement on math
for the treatment groups

GROUP	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference
Control	74	12.60	2.57	.98	147	.324	.46
Experimental	75	12.14	3.08				

Table 3 shows that students in the cooperative treatment method were not significantly different on their achievement on the posttest2 (retention test) on math from the students in the traditional method. This result contradicts the results obtained by others (Hassan, 2001; Dishon & O'Leary, 1984; Johnson & Johnson, 1990; Slavin, 1991, Cavalier, Klein & Cavalier, 1995), as they found a significant difference in favor of cooperative treatment method. This result could be attributed to the fact that the Omani female student are not familiar with the method of cooperative learning strategy. Providing students with more practice of cooperative learning strategy might affect their retention.

The third question of the study which states "Is there a significant difference in the attitudes toward the teaching methods used for students in both groups?"

Students' attitudes toward the teaching method were measured with a twenty-item Likert- style survey. Mean scores and standard deviations are shown in Table (4).

Table (4) T test for attitude scores of the treatments groups

GROUP	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference
Control	64	47.25	9.05	7.95	136	.00	9.34
Experimental	74	56.59	4.17				

The mean attitude score for students in the cooperative learning group was 56.59 (std. = 4.17), while the mean score for students in the traditional group was 47.25 (std. = 9.05). A t-test showed a significant difference in attitudes toward the teaching method between the groups ($t = 7.953$, $df = 134$, $p < .00$). Based upon the last finding of this study, the cooperative learning approach is more favorable in attitudes toward the method of instruction than the traditional learning approach. This

result is consistent with other studies indicating that cooperative learning strategy has strong influence on attitude and motivation (Johnson and Johnson, 1989; Klein and Pridemore, 1992; Slavin, 1991; Cavailier et al., 1995; Brancov, 1995; Whicker et al., 1997; DePree, 1998). This result could be justified by the fact that cooperative learning strategy breaks the routine of daily traditional teaching methods. In addition, cooperative learning strategy gives the students the chance to show their communication abilities, interact with each other and to take responsibility of their learning when they work together. Each student must put some inputs in the learning process and contribute to the learning of other members in her or his group.

Recommendations and Suggestions

Cooperative learning was not found to be more effective than traditional learning with respect to students' achievement and retention in this study. This result could be attributed to the fact that regardless of the unfamiliarity of Omani students with this approach, their performance in the tests is equal to their counter partners. This result is consistent with findings from studies of Foote (1997) and Whicker (1999). The current study has shown that cooperative learning method was as effective as traditional method with regard to achievement and retention. Students taught by cooperative methods performed equally as well as students taught by traditional methods. However, students' attitudes toward cooperative learning strategy were better than those in the traditional method.

The researchers suggest additional research in cooperative learning strategies to be conducted in mathematics education. Studies in which cooperative learning strategies are used for a semester or an entire year should be conducted to determine if student achievement is increased with additional experience in using cooperative learning. Future research should also focus on comparisons between different models of cooperative learning, as well as comparisons with other learning strategies.

Other variables such as social interaction, gender, different branches of mathematics and grade levels should be studied using cooperative learning strategies. Regarding teachers' training, the researchers recommend the use of different technologies of instruction in teacher training programs.

فاعلية إستراتيجية التعلم التعاوني في المدارس العمانية

زهية بنت ناصر الشكيلي

وزارة التربية والتعليم
سلطنة عمان

د. أحمد يوسف عبدالرحيم

كلية التربية - جامعة السلطان قابوس
سلطنة عمان

هدفت هذه الدراسة لتحديد أثر إستراتيجية التعلم التعاوني كتنقية عمليات على التحصيل والاحتفاظ بالمعلومات واتجاهات الطلاب نحوها. باستخدام المنهج شبه التجريبي، تم اختبار الطلاب بامتحان تحصيلي ووزع عليهم مقياس اتجاهات بعد إكمالهم لوحدة الأعداد النسبية. ثم أعطي الطلاب اختباراً تحصيلياً لقياس الاحتفاظ بالمعلومات بعد مضي ٣ أسابيع من الاختبار التحصيلي الأول للكشف عن الفروق بين مجموعتي الدراسة. أظهر اختبار ت أنه لا توجد فروق ذات دلالة إحصائية في التحصيل أو الاحتفاظ بالمعلومات بين مجموعتي الدراسة (التعاوني/ التقليدي). بينما أظهر اختبار ت فروقا ذات دلالة إحصائية في اتجاهات الطلاب نحو الطريقة التدريسية لصالح مجموعة إستراتيجية التعلم التعاوني.

References

- 1 - Abdulrahman, Mohammad (1996). The effects of cooperative learning strategy in teaching mathematics on developing innovative thinking of preparatory pupils and their achievement. **Journal of College of Education**, Zagazeeq University, 25, 403-4032 (In Arabic).
- 2 - Abdulrahman, Madehah (1993). The effectiveness of using cooperative learning strategy in primary school students achievement in mathematics. **Journal of College of Education**, Assuit University 2(9), 557-573 (In Arabic).
- 3 - Abuzeenah, Fareed and Khatab, Mohammad (1995). The effects of cooperative learning strategy on students achievement in mathematics and their attitudes toward it. **Journal of College of Education**, United Arab Emirates University, 10(11), 233-268 (In Arabic).
- 4 - Almeqbaly, Khamis (2003). The effects of using mathematics in teaching on mathematics prospective teacher achievements. Unpublished Master thesis at Sultan Qaboos University, Muscat, Oman (In Arabic).
- 5 - Alsharif, Slahuedeem (2000). The extent to which cooperative learning strategy affects mathematics learning difficulties. **Journal of College of Education**, Assuit University 16(3), 507-523 (in Arabic).
- 6 - Alzaghlol, Rafaa and Abainah, Abdullah (1998). The effects of cooperative learning strategy in seventh grade students achievement in mathematics. **Journal of College of Education**, United Arab Emirates University, 3(15), 439-523 (In Arabic).
- 7 - Bard, T. B. (1996). Cooperative activities in interactive distance learning. **Journal of Education for Library and Information Science**, 37 (1), 2-10.
- 8 - Brancov, T. (1995). Cooperative learning in mathematics with middle school Indian students: A focus on achievement and on task behavior. **DAI-A55/11, P3396**

- 9 - Carol, A. (1988). High school graduates in entry level jobs: What do employers want? (**Eric Digest No. 40**). New York: **Reproduction Service No. ED 293972**.
- 10 - Carson, L. (1990). Cooperative learning in the home economics classroom. **Journal of Home Economics**, 82(4), 37-41.
- 11 - Cavailier, J., Klein, J., & Cavailier, F. (1995). Effects of cooperative learning on performance, attitude, and group behaviors in a technical team environment. **Educational Technology Research and Development**, 43(3), 61-71.
- 12 - Crooks, S.M. and Klein, J.D. (1996). Effects of cooperative learning and learner-control modes in computer-based instruction. **Journal of Research on Computing in Education**, 29(2), 109-124.
- 13 - DePree, J. (1998). Small group instruction: Impact on basic algebra students. **Journal of Developmental Education**, 22(1), 2-6.
- 14 - Deutsch, M. (1962). Cooperation and trust: Some theoretical notes. In M. R. Jones (Ed.), **Nebraska symposium on motivation**, 275-319. Lincoln, NE: University of Nebraska Press.
- 15 - Dishon, D. & O'Leary, P. (1984). **A guidebook for cooperative learning: A technique for creating more effective schools**. Holmes Beach, FL: Learning Publications.
- 16 - Felder, R. (2001). Technology-Based Instruction and Cooperative Learning, the Interface (IEEE Education Society), pp. 2-3. Available: <http://www2nesuedu/unity/lockers/users>
- 17 - Foote, E. (1997). Collaborative Learning in Community Colleges. (**Eric Digest No. 40**). New York: Reproduction Service No. ED 293972.
- 18 - Hassan, Mahmoud (2001). The effects of cooperative learning strategy on fifth grade students achievement in mathematics retention and developing their deductive thinking. **Journal of College of Education**, Assuit University, 17(2), 217-246 (In Arabic).
- 19 - Heinich, R., Molenda, M., and Russell, J. (1989). **Instructional**

- media and the new technologies of instruction.** NY: Macmillan Publishing Company, USA.
- 20 - Heinich, R., Molenda, M., Russell, J. and Samaldino, S. (1999). **Instructional media and the new technologies for learning.** NY: Macmillan Publishing Company, USA.
- 21 - Imel, S. (1989). Employers' expectations of vocational education. (Eric Digest No. 90). Columbus, Ohio: ERIC Clearinghouse on Adult, Career, and Vocational Education, (**ERIC Document Production Service No. ED 318912**).
- 22 - Johanning, D. (2002). An analysis of writing and postwriting group collaboration in middle school pre- algebra. **School Science and Mathematics**, 100(3),151- 58
- 23 - Johnson, D.W., & Johnson, R.T. (1987). **Learning together and alone: Cooperative, competitive, and individualistic.** Englewood Cliffs, NJ: Prentice Hall.
- 24 - Johnson, D.W., & Johnson, R.T. (1989). **Leading the cooperative school.** Edina, MN: Interaction.
- 25 - Johnson, D.W., & Johnson, R.T. (1990). Social skills for successful group work. **Educational Leadership**, 47(4), 29-33.
- 26 - Johnson, D.W., & Johnson, R.T. (1991). **Learning together and alone: Cooperative, competitive, and individualistic**, Third Edition. Englewood Cliffs, NJ: Prentice Hall.
- 27 - Johnson, D.W., Johnson, R.T., & Holubec, E.J. (1986). **Circles of learning: Cooperation in the classroom.** Edina, MN: Interaction Book Company.
- 28 - Johnson, L. (1984). The effects of "Group of four" program on student achievement. **ED 25499**.
- 29 - Kerka, S. (1990). Job related basic skills. (Eric Digest No. 94). Columbus, Ohio: ERIC Clearinghouse on Adult, Career, and Vocational Education, (**ERIC Document Production Service No. ED 318912**).
- 30 - Klein, J. & Pridemore, D. (1992). Effects of cooperative learning and need for affiliation on performance, time on task and

- satisfaction. **Educational Technology Research and Development**, 40 (4), 39-47.
- 31 - McMillan, J. and Schumacher, S. (1993). **Research in education: A conceptual introduction**. NY: Harper Collins College Publishers.
- 32 - Noah, Mohammad (1993). Experimental study on the effects of cooperative learning in the achievement of second year preparatory students of Algebra skills. **Educational Journal**, Kuwait University, 8(27), 131-168 (In Arabic).
- 33 - Pomplun, M. (1996). Cooperative Groups: Alternative Assessment for Students with Disabilities? **Journal of Special Education**, 30 (1), 1-17
- 34 - Putnam, J. (1998). **Cooperative learning and strategies for inclusion**. NY: Pual H. Brooks Publishing Co.
- 35 - Slavin, R.E. (1991). **Student team learning: A practical guide to cooperative learning**. Washington, D.C.: National Education Association.
- 36 - Singhanayok, C. & Hooper, S. (1998). The Effects of Cooperative Learning and Learner Control on Students' Achievement, Option Selections, and Attitudes. **Educational Technology Research and Development**, 46(2), 17-33.
- 37 - Whicker, K. (1999). Cooperative learning in high school advance mathematics courses. **DAI-A60/06,P1951**.
- 38 - Whicker, K., Pol, I. and Nunnery, J. A. (1997). Cooperative learning in the secondary mathematics classroom. **The Journal of Educational Research**, 91(1), 42-48.
- 39 - Yu, Fu-Yun. (1998). The Effects of Cooperation with Inter-Group Competition on Performance and Attitudes in a Computer-Assisted Science Instruction. **Journal of Computers in Mathematics and Science Teaching**, 17 (4), 381-95.

