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OMANI SCIENCE TEACHERS USE OF COOPERATIVE WORK IN BASIC EDUCATION SCHOOLS

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Abstract

The aim of this study is to explore the use of cooperative work by science teachers. Quasi-experimental research design was used. This study was carried out in academic year of 2010-2011 at Basic Education schools in Oman. The sample consisted of 25, male (N=12) and female (N=13) science teachers working in 5 Basic Education schools. A 4-point of 39 statement scale observation checklist was developed to find out the extent to which teachers were applying collaborative work effectively.
Findings reveal that teachers either followed the traditional seating arrangements, or just placing students in groups without any cooperative learning strategies. Findings also indicated no statistically significant difference due to the teacher's gender in the way collaborative work is applied in co-schools.
Key words: *cooperative work, Oman, school science, science teacher*.

Introduction

Within the complex framework of human evolution, the continuity and development of societies has, to a large extent, depended on their capacity to foster values and strategies of active co-operation and solidarity between and among their members (Mercer, Dawes, Wegerif and Sams, 2004). This also applies to education.

If the goal of education is to help students to learn in the most appropriate way, teachers must understand the sources of students' difficulties and learn how to overcome them in order to improve learning. One of the best ways to enhance learning is by collaboration. There is an important connection between teachers' efforts to promote students learning. Organizing students into groups will certainly provide them an opportunity to work closely with their classmates. The common factor in this educational approach is that the students work as a team, which means that each person is accountable for the performance of the group. This cooperative approach can be associated with most teaching modes as it offers opportunity to students to discuss ideas, and build, activate or even modify their existing knowledge or misconceptions (Bilgin and Geban, 2006).

Knowing that peers relying on each other to accomplish a common goal is a powerful motivator for cooperative work, students must perceive that they are responsible for and dependent on all the others, and that one cannot succeed unless all in the group succeed, i.e. they either "sink or swim" together (Kohn, 1986).

Psycho-pedagogic literature offers a large number of guidelines that should be borne in mind when setting up cooperative-work activity, in order to ensure that group members co-operate with each other and develop the skills required. The approach to the work has to foster positive inter-dependence, that is, the responsibilities and tasks of each person should be clearly defined so as to encourage co-operation (Johnson, Johnson and Smith, 1998). Strategies for

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promoting interdependence include specifying common rewards for the group, encouraging students to divide up the labor, and formulating tasks that compel students to reach a consensus (Johnson, Johnson, 2003).

Moreover, activities must be designed to encourage active learning, and this must be done in such a way that the learners raise questions, take the initiative, plan, restructure, experiment and do project-work (Schwartz and Pollinshuke 1995; Lunenberg and Volman, 1999).

According to the literature, cooperative work appears to have both educational and social advantages. Many researchers indicate significant gains in measures of academic achievement, social relationships, social skills, self-esteem, and attitudes towards schooling and learning when there is a group setting rather than when there is individual competition. In their study, Acar and Tarhan (2008) indicated that students' achievement in chemistry was significantly higher when learning by cooperative work and, for example, the misconceptions related to metallic bonding were found to be less. Frankland (2007) affirms that students involved in cooperative work tend to do most of the thinking, originate their own ideas, learn from each other, organize the discussion, and establish priorities that cover the material in the time available without input from the teacher. Reznitskaya, Anderson and Kuo (2007) found that students who had received explicit instruction in argumentative discourse during group discussions displayed significantly better knowledge of the argument schema than their peers who had not received such instruction. According to Bilgin and Geban (2006), cooperative learning increases the performance levels of students solving conceptual problems in chemistry. Acar and Tarhan (2006) also found that students using cooperative learning instruction had significantly higher scores in terms of physics achievement than those taught by the traditional approach. It was also found that instruction for the collaborative group was more successful in remediation, for example, for the predetermined misconceptions in electrochemistry. In a study conducted by Mercer et al. (2004), children who were taught to talk and reason together as they participated in inquiry- based science activities were found to be able to demonstrate significantly better knowledge and understanding of scientific concepts and relevant parts of the science curriculum than those who had not participated in such training.

As a developing country, Oman has large numbers of students in each classroom; however nowadays, the average number is 35 in Basic Education schools (A 10-yeras compulsory Education of two cycles; Cycle 1= grades 1-4, and cycle 2 = grades 5-10). Nevertheless, this is still poses a problem for teachers in both managing and assessing students. In addition, each lesson is short, usually only 40 minutes, too short for teachers to be able to pay attention to individual students, oral participation or even practical work. But, the researcher's unstructured interviews with teachers as well as frequent visits to classes as a supervisor for student teachers of science increased the feeling that some teachers essentially face different types of problems and difficulties while trying to apply cooperative work effectively.

Although, because of the lack of science laboratory apparatus and materials teachers are supposed to provide demonstrations and also use cooperative work, it is not known whether teachers are aware of the benefits of making effective use of cooperative work activity.

According to the researcher's knowledge, few Omani studies have tackled the use of cooperative work in science and none have justified or talked about the way cooperative work has been used, or how effectively it is used by science teachers. This is particularly essential and necessary to investigate as the Ministry of Education emphasizes the effective use of cooperative work in teaching science.

Thus, the present study is trying to explore the use of cooperative work in the Omani Basic Education schools and to know whether it is applied in a successful manner to meet the demands of Ministry of Education criteria which are again based on characteristics of successful cooperative work found in the literature.

Consequently, this study is expected to provide information on the way the science

teachers use cooperative work in their day to day teaching. It will also provide information on the challenges that may hinder Omani teachers and pupils in getting maximum benefit out of cooperative work. Furthermore, the study would hopefully add to the literature already produced in general, and the Ministry of Education in using cooperative work in schools in particular.

Research Questions

1. To what extent do science teachers apply cooperative work in their classroom teaching?
2. Does the use of cooperative work differ with respect to the teacher's gender?

Methodology of Research

Research Population and Sampling

The population included 110 Omani science teachers in the capital, Muscat, teaching in the academic year 2010/2011, from whom a sample of 25, male (N=12) and female (N=13) teachers working in 5 Basic Education schools were taken randomly as the study sample.

Research Instrument

A 4-point Likert scale observation checklist was developed to find out the extent to which teachers were applying collaborative work effectively. The checklist consisted of a list of 39 statements categorized into two parts as follows:

- **Part** (1): Factors related to the learner: This included 23 statements in 5 domains (group organization, cooperation, group interaction and inter-dependence, group motivation and group leaders) which were used based on the features of collaborative work with relation to the learners' role.
- **Part** (2): Factors related to the teacher: This included 16 statements in two domains (managing groups and group evaluation) which were likely to be used based on the features of collaborative work with relation to the teachers' role.

The observer indicates his degree of agreement to each of the statements by putting a tick in one item of the checklist scale (agree, medium, disagree and not exist). A score was given for each choice of the five options as follows: agree (3), medium (2), weak (1), does not exist (0). The negatively worded statements were indicated with an asterisk under each category and they were re-coded before the statistical analysis of data.

Each of the 25 teachers in the sample was observed by both observers two times for a total of 50 visits. One of these two visits to each of the 25 teachers was made by the researcher himself, whereas the other visit was made by a teacher supervisor in science education with a Masters degree. The checklist was administered in nine weeks and data obtained was analyzed using the proper statistical methods.

Validity and Reliability

The checklist was reviewed by six experts in the Faculty of Education at Sultan Qaboos University to establish their face and content validity. They were asked to check statements in terms of the clarity of the statements wording and their relevance to the categories and the aims of the study. According to their comments and for the purpose of simplicity and clarity, some statements were deleted, added or modified.

The checklist was also piloted to establish its reliability. The two observers made three different joint class visits and discussed their comments in order to finalize their shared understanding and the uniformity of the statements on the observation checklist.

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To answer the study questions, the researcher calculated frequencies, means, and standard deviations of the sample observations. The final level of the way cooperative work is used by Omani science teachers in Basic Education schools is based on the mean value given by the observers according to the following criteria:

Table 1. Criteria.

Practicing Degree	Criterion
High	if the value of the mean is (2.26-3.0)
Medium	if the value of the mean is (1.51-2.25)
Low	if the value of the mean is (0.76-1.50)
Non-existent	if the value of the mean is (0.00-0.75)

To answer question 1, the data was collected through the observation checklist using the 4-point scale. While, Scale 1 and 2 depict the negative aspect of using cooperative work, Scales 3 and 4 depict the positive aspects of using cooperative work. Whereas, question 2 involves using of an independent sample t-Test.

Results of Research

Results Related to Question 1

To what extent do science teachers apply cooperative work in their classroom teaching?

To show the way collaborative work is done by Omani science teachers in Basic Education schools, the overall mean scores of the 39 checklist statements mentioned under the 7 categories were calculated as exposed below in Table 2.

Table 2. Means and standard deviations of the instrument categories.

No	Category	No. of Teachers	Mean	Std. Deviation
1	Group Organization	25	0.60	0.6
2	Cooperation		0.66	0.6
3	Group Interaction and Interdependence		1.30	0.7
4	Group Motivation		0.70	1.2
5	Group Leaders		0.84	0.8
6	Managing Groups		0.96	0.4
7	Group Evaluation		1.10	0.6

The above table shows the mean scores obtained through descriptive statistics. It is very clear that all of the categories have more or less similar means. Significantly, Category 1, Group Organization, received a mean 0.60 signifying that teachers do this better than the other categories but still not satisfactorily. However, only Category 3 has a slightly higher mean of 1.3. When compared with the other categories, this signifies that none of the sample population has tried to use group Interaction and Interdependence effectively in their classrooms.

In general, this table shows that, although all of the seven Categories are below a satisfactory level, Group Interaction and Interdependence received the highest mean (1.30) and Group Organization received the lowest mean (0.60).

The results of the 39 statements listed in the observation checklist, are given in Table 3 below:

Table 3. Means and standard deviations of the instrument statements.

Cat.	No	Statement	Mean	Standard Deviation
Group Organization	1	The time taken by pupils to get into groups is too long	1.40	0.5
	2	All groups are formed with an equal number of pupils	0.29	0.7
	3	Number of pupils in each group are between 4-6	0.32	0.7
	4	All groups are given names	0.21	0.4
	5	All groups had enough space, a place and materials required to do the task	1.04	0.4
	6	The seating arrangements helped all members to interact face to face with one another	0.42	0.6
	7	Noise level is too high (affected learning)	0.52	0.9
Cooperation	8	Pupils supported each other while working together	0.60	0.8
	9	Individual pupils in groups shared their knowledge and skills with one another	0.62	0.8
	10	Some pupils keep complaining about other learners	0.68	0.5
	11	Pupils practiced good social skills like helping, caring and sharing things and ideas	0.70	0.4
	12	Groups that finished early helped other groups	0.70	0.5
Group Interaction & Inter-dependence	13	Pupils have the opportunity to work independently, not depending totally on the teacher	1.32	0.8
	14	Pupils do not request assistance from the teacher before they have exhausted all other ways	1.26	0.7
	15	The task gives a chance for all pupils to interact and participate with one another	1.34	0.6
	16	One or few group members dominate the talking	1.22	0.8
	17	Each member in a group is able & ready to display/ present his group's work	1.38	0.6
Group Motiva-tion	18	The members in groups were enjoying the activity in a relaxed set up and showed interest and enthusiasm	0.60	1.4
	19	Groups showed signs of boredom or being over burdened during the completion of the task	0.62	1.3
	20	A few students in some groups remained passive and did not mix with other group members	0.88	0.9
Group Leaders	21	Group leaders were active enough to make their groups function smoothly	0.36	0.6
	22	Some group leaders were ineffective	1.26	0.6
	23	Group leaders helped the teacher in organizing materials	1.20	1.2
Managing Groups	24	The instructions given to groups were easy and clear enough to follow	0.95	0.4
	25	The teacher discussed with pupils the benefits and importance of working in groups	0.76	0.3
	26	The teacher focused on pupils behavior towards supporting each other to get a good outcome/ result	0.92	0.3
	27	The teacher concentrated on passive participants	0.84	0.5
	28	The teacher divided the work among the group members to make it easier (assigning roles)	0.82	0.4
	29	The teacher kept good watch on all groups' performance and con-trolled them when needed	0.82	0.5
	30	The teacher tried to reduce his role by talking less in order to encourage more pupils' participation and talk	0.80	0.3
	31	The teacher rewarded the groups that had better organization and team work	0.91	0.5
	32	The teacher encouraged the individuals/ groups that had difficulties and problems	0.74	0.4
	33	The teacher paid equal attention to all groups	0.84	0.4
	34	The pupils were encouraged to use peer correction	0.86	0.4
Group Evaluation & Assessment	35	The teacher gave constructive feedback to each group when they finished their work	1.20	0.8
	36	The teacher spared some time for pupils to discuss how well they worked together and what they could do to work better next time	1.24	0.7
	37	The teacher corrected both whole groups' work and individual pupil's work while monitoring	0.80	0.5
	38	The teacher had enough time to evaluate the performance of each groups' work	1.38	0.4
	39	The teacher created positive competition between groups by offering rewards and recognition	1.16	0.8

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When the individual statements are considered, the above table shows that statement 1 under category 1, "The time taken by pupils to get into groups is too long", received the highest mean score (1.40). Though, both statements 17 and 38 under categories 3 and 7, "Each member in a group is able & ready to display/ present his group's work", and "The teacher had enough time to evaluate the performance of each groups' work" received the second highest mean score (1.38), followed by statement 13, "Pupils have the opportunity to work independently, not depending totally in the teacher" with a mean of 1.32. This ranking indicates that the factor of the time constraint hindered teachers discouraging them from using cooperative work.

In contrast, statements 4 and 2 under category 1, "All groups are given names", and "All groups are formed with an equal number of pupils' received the lowest mean scores (0.21) and (0.29) respectively clearly affirm what have been stated about using cooperative work.

Results Related to Question 2

Does the use of cooperative work differ with respect to the teacher's gender?

To know whether the use of cooperative work differed due to gender of the study sample, mean scores were calculated using an independent sample t-Test giving the following data:

Table 4. Results of the use of cooperative work.

Gender	N	df	Mean	t- value	Sig.
Male	12	23	0.83	1.48	0.154
Female	13		1.07		

The data shows that there is no significant difference (at α=0.05) in the way cooperative work was utilized by male or female teachers.

Discussion

Student-centered approaches to learning place great emphasis on ensuring that students are actively involved in their learning. The findings of this study showed that teachers are not contended with cooperative teaching strategies in an effective way. Almost the entire study sample was either seated in a lockstep format as in the environment in many traditional classrooms or placing students in groups without any cooperative learning strategies. This finding could be a result of the way Omani science teachers think about cooperative work. This might be attributed to both teacher education and in-service programs which could be incompetent to provide teachers with the suitable skills to efficiently use cooperative work in their day to day teaching, or these programs do not stress the cooperative work sufficiently in their courses and practicum.

Despite the fact that teaching at high schools is segregated according to gender, there is no statistically significant difference due to the teacher's gender in the way cooperative work is applied. This might be attributed to the fact that both male and female teachers were teaching the same syllabus in an identical school system and under similar conditions, exposed to the same training needs, and had almost the same atmosphere and teaching tasks.

Conclusion

Implementing cooperative learning in class promotes the learning process, interaction and communication in the classroom. Accordingly, there is a need to increase the teachers' knowledge about the benefits of using cooperative work to enhance pupils' learning outcomes.

Moreover it is crucial to encourage and enlighten schools' administrations to provide all types of support and facilities to their teachers so that they will not desist from using cooperative work. The study also recommends pre-service programs to extensively address cooperative work techniques when preparing science teachers. Further research is required to tackle the situation of implementing cooperative work effectively, and to elucidate various problems and difficulties involved in using cooperative work effectively at the school level.

References

Acar, B., Tarhan, L. (2008). Effects of Cooperative Learning on Students' Understanding of Metallic Bonding. *Research in Science Education*, 38, 401-420.

Acar, B., Tarhan, L. (2006). Effect of using cooperative learning startigies on students' understanding of concepts in electrochemistry. *International Journal of Science and Mathematics Education*, 5, 349-373.

Bilgin, I., Geban, O. (2006). The Effect of Cooperative Learning Approach Based on Conceptual Change Condition on Students' Understanding of Chemical Equilibrium Concepts. *Journal of Science Education and Technology*, 15(1), 31-46.

Frankland, S. (2007). *Teaching with Group Work, Peer and Self Assessment*. In Frankland, S., Cho, P., James, N., Miles, M., Richetts, C. (Eds.), *Enhancing Teaching and Learning through Assessment*: Deriving an Appropriate Model. Springer, p. 144-155.

Johnson, D., Johnson, R. (2003). *Joining Together: Group theory and group skills* (8th Ed.). Boston: Allyn and Bacon.

Johnson, D., Johnson, R., Smith, K. (1998). A*ctive Learning: Cooperation in the College Classroom*, Edina, MN: Interaction Book Company.

Mercer, N., Dawes, L., Wegerif, R., Sams, C. (2004). Reasoning as a scientist: ways of helping children to use language to learn science. *British Educational Research Journal*, 30, 359-377.

Reznitskaya, A., Anderson, R., Kuo, L. (2007). Teaching and learning argumentation. *The Elementary School Journal*, 107, 449-472.

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