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Effect of student team achievement division (STAD) on academic achievement of undergraduate psychology students

Mohammad Reza Keramati *[a]

[a] *Associate professor of Educational planning and management. Faculty of Education, University of Tehran, Iran*

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Abstract

Introduction: This paper reports the results of an investigation on the effect of cooperative learning (STAD style) on academic achievement.

Materials and methods: Sampling of the study consists of 80 (22-23 years old) students at a state university in Iran. Levels of pre-knowledge acquired by the students were evaluated by means of a self-developed instrument. A clear significant difference, as a conclusion, was detected in favor of the experimental group indicating the success of the STAD.

Results: it is found that cooperative learning helped students to develop some of their educational and psychological skills, because the cooperative activities encouraged students to interact freely and communicatively and consequently increasing their academic achievement in Developmental psychology and Physiological psychology courses to a higher level. But it seems conventional teaching hardly improves the teaching of concepts and academic achievement

Conclusion: in non-cooperative classrooms, in which conventional teaching are used faculty members often talk most of the time and only a few of the brightest learners have the opportunity to participate, usually by responding to the teacher. So, it is found that experimental group students taught by cooperative learning are more successful than control group students taught by conventional teaching.

* **Corresponding Author**: Email: Mkeramati47@yahoo.com

1. Introduction

Although research results of many researchers who focus on teaching various topics of university indicated that conventional teaching hardly improves the teaching of concepts (Crouch and Mazur, 2001), conventional teaching is still the mode of preference in the majority of classrooms and insuring involvement of the student has been a persistent concern (Johnson et al., 1991; Meyers and Jones, 1993; Bonwell, 1996). College faculty member have gradually sought ways to improve student learning (Lightner et al., 2007). One potential solution that has emerged in the past several years has been the introduction of cooperative learning.

While earlier interest in cooperative learning is acknowledged (eg., Hains and McKeachie, 1967), throughout the 1970's and 1980's social and educational psychologists (Aronson et al., 1978; Johnson and Johnson, 2002; Johnson and Johnson, 2005) have produced a considerable volume of research demonstrating the effectiveness of a great variety of small group cooperative pedagogical strategies, especially at the higher educational level. A few examples of recent uses of cooperation in university settings might be Carroll's (1986) study using Aronson's "Jigsaw" technique in undergraduate psychology classrooms, or Lamberights' (1988) report of successful implementation of Jigsaw techniques in a similar setting. Sherman (1988) has described the use of Slavin's Student Teams and Achievement Divisions (STAD) technique as well as Sharan's Group-Investigation (G-I) Model in undergraduate educational psychology classes. In the past five years several new articles have analyzed the uses of cooperative learning in a variety of post-secondary educational settings (Dansereau, 1985; Dansereau et al., 1986; Sherman, 1986; Hanze and Berger., 2007).

Most social psychology textbooks contain considerable discussions about conflict, sometimes investigated by individual or inter-group competition, and its resolution and/or reduction through the use of cooperative techniques. Social Psychologists' interests in intergroup relations are beginning to acknowledge the effectiveness of cooperative learning (e.g., Hains and McKeachie, 1967). Almost all introductory educational psychology textbooks (e.g. Slavin, 1991; Dembo, 1994) now contain extended discussions of cooperative pedagogies and their effectiveness with regard to improved racial relations, self- esteem, internal locus of control and academic achievement (Levine and Moreland, 1990).

Benefits of cooperative learning, which is defined as "involving three or more children who work together in a group in order to maximize their own and each other's learning" were indicated by various studies (Jones and Steinbrink, 1989., Jordan and Le Metaias, 1997; Towns and Grant, 1997; Kagan et al., 2000; Boxtel et al., 2000; Balfakih, 2003; Daubenmire, 2004). Thus, while there appears to be considerable evidence supporting the effectiveness, as well as need, for cooperative learning applications in university settings, much more needs to be accomplished. The remainder of this introduction is a series of brief definitions and benefits of cooperative learning. Cooperative learning is one of the most dynamic (Dalton, 2008), active and powerful learning methods (Mahran, 2000) because it is both an effective pedagogy and a compelling philosophy and worldwide view (Cohen et al., 2004). So, it is attracted scholars today.

Cooperative learning refers to the instructional use of small groups in which students work together to accomplish meaningful study tasks. Norman (2005) stated that cooperative learning includes different basic elements: the first one is positive interdependence. Positive interdependence is defined as having specific roles for each participant that are necessary for the group to work toward the goal(s) set by the teacher, i.e., each student have a particular role within the group. Webb (2002) describes positive interdependence as the first and most important element in cooperative learning. He claims that, "in this element, responsibility for the group and the individual is structured into the lesson or subject". Webb adds that you should give a clear task and a group goal so that students believe they “sink or swim together”. Jacobs (2006) asserts that positive interdependence is a perception among group members that what helps one group member helps all, and what hurts one group member hurts all. Positive interdependence encourages cooperation and a feeling of support.

Arendale (2005) sees that "positive interdependence is established in the group through adoption of different roles that support the group moving to complete a goal. It may also promote cohesion and solidarity among learners. Meanwhile, negative interdependence results from inappropriate competition when students engage in a win-lose struggle to see who is best. The second essential element of cooperative learning is individual and group accountability. Jacobs (2006) and Andrusyk et al. (2003), state that the student is held responsible by teammates for contributing his or her fair share to the group's success. Individuals who need more assistance, support, encouragement, and other accommodations to complete the assignment are acknowledged. Individual accountability occurs when each student is assessed individually with the results reported back to the group. Tan et al. (1999) determines that individual accountability is a feeling among a group, that each member is responsible for his-her own learning as well as that of his-her teammates.

The third essential component of cooperative learning is group processing. Webb (2002) states that this element exists when group members discuss how well they are achieving their goals and maintaining effective working relationships. Brandt and Robe (2002) describes group processing as; "the activities that allow discussion of interpersonal skills and influence the effectiveness of the group's ability to work together".

Andrusyk et al. (2003) assert that group processing allows team members to address how well the group is functioning and to maintain the effectiveness of the group. The fourth essential component of cooperative learning is social skills. Faryadi (2007) emphasizes that the focus should be on the participants` ability to share materials. Participants also demonstrate consideration for others by keeping their voices at a reasonable level. Dollman (2007) states that in the case of social skills, each group member describes what actions were helpful and unhelpful. The group agrees on what actions to continue or change. The purpose is to clarify and improve the effectiveness of each member's contributions to the collaborative effort to achieve the group's goals. Fifth essential component of cooperative learning is face-to-face interaction. In this element students do real work together, sharing resources, helping, supporting, encouraging, and praising each other's efforts to learn. By this interaction, they promote each other's success (Webb, 2002).

Slavin (1991) at John Hopkins University, based on years of research on cooperative learning developed an approach -called Student Team Achievement Division (STAD). It has been used in a wide variety of subjects, from math to language arts to social studies. STAD is a way to organize classes, with the principal goal being to accelerate the achievement of all students (Norman, 2005).

One of the benefits of using cooperative learning in the classroom is enhancing social skills and increasing academic achievement (Dohran et al., 2001; Yang and Cheung, 2005; Willis, 2007). Schlitz and Susan (2001) point out that "using cooperative learning in the regular and special education classrooms can help to teach students how to socialize appropriately and can give them opportunities to practice. It can provide tools to transfer the skills learned into real life situations".

The second benefit of using cooperative learning is appreciating differences. The more student work in cooperative groups, the more they understand, retain, and feel better about themselves and their peers. Working in a cooperative environment encourages student responsibility for learning. Cooperative learning increases student motivation by providing peer support. Gillies and Boyle (2008) and Gillies (2004) determine that cooperative learning is an effective way to build community between home and school cultures with culturally and linguistically diverse students.

The third benefit of using cooperative learning in the classroom as Yang and Cheung (2005) declare is individualization of instruction. In a traditional classroom with a heavy emphasis on a lecturing method and a whole-class discussion, teachers have to cater their instruction to the average. The fourth benefit is increasing student participation. The fifth benefits of using cooperative learning in the classroom as Yang and Cheung (2005) state is increasing motivation and positive attitude toward learning. According to Yavuz, (2007), cooperative

learning fosters positive attitudes toward working with others, and creates thinking skills that are necessary to acquire and integrate knowledge.

The sixth benefit is decreasing anxiety. Students often feel anxious to speak in front of the whole class. In contrast, there is less anxiety connected with speaking in the smaller group. In addition, when a student represents the group and reports to the whole class, he/she feels more support, because the answer is not just from one student alone (McDonough, 2004).

The next benefit as Yang and Cheung (2005) declare is increasing self-esteem and the last benefit is increasing academic achievement. Holliday (2002) state that cooperative learning is the best means of improving the academic achievement. Benefits of cooperative learning also were indicated by various studies (Boxtel et al., 2000; Balfakih, 2003; Daubenmire, 2004; Jones and Steinbrink, 1989; Jordan, and Le Metaias, 1997; Kagan et al., 2000; Towns and Grant, 1997). Results of these studies also indicate that cooperative learning increases academic achievement (Burcin and Leman, 2007; Zafer and Mostafa, 2008), reinforces individual and group accountability, strengthens listening, improves affective relationship, increases confidence, increases verbal skills, reduces anxiety and students' teacher dependence (Cohen et al., 2004), encourages positive interactions among peers, and also increases enthusiasm and motivation towards learning (Hollingsworth et al., 2007).

Higbee and her colleagues (2007) at the University of Minnesota had demonstrated that although the existence of a diverse student body can assist students from historically underrepresented populations in feeling that they are not "alone" at the institution, diversity without multiculturalism provides an empty promise. They emphasized the necessity to integrate multiple perspectives in our daily work to create the required welcoming and safe learning environments (Fazilah and Zuraidah, 2003). Because of its remarkable characteristics, cooperative learning, can serve a good method to reduce the heterogeneity effect and create a harmony within a heterogeneous body structure and consequently affect the achievement and the attitudes of learners.

An Onwubuzie research result (2001) show that co-operative learning, have equal effects on academic achievement of all students' girls, boys, high achievers, low achievers and moderate achievers but according to Keramati and Zade Qolam's research results (2009) the effect of cooperative learning on the academic achievement scores in boys and girls is unequal. On the other hand, the girls benefit in the cooperative learning more than the boys.

Although Findings in Iran approved the effects of cooperative learning on academic achievement of students in elementary schools on topics including mathematics (Keramati, 2007; Hamami, 2004) and physics (Keramati and Hosseyni, 2008; Keramati and Zade Qolam, 2009). However, less often studied are the effects of cooperative learning on academic achievement of postgraduate students? In particular, little is known about how cooperative learning influences academic achievement of students at university. Therefore, in the present study, it is decided to investigate the effects of STAD as one of the popular style of cooperative learning approach on academic achievement of students. So the research hypothesis of the study is that STAD has clear advantages concerning academic achievement of students with respect to the conventional teaching relating physiological and developmental psychology course.

2. Method

2.1. Research Model

Pre-test and post-test controlled group experimental model is employed in the research. Independent variables of the research consist of STAD one of cooperative learning styles and conventional teaching method. Dependent variable of the study is academic achievement. In STAD, students study with 4-5 members following a teacher presentation. STAD is a way to organize classes, with the principal goal being to accelerate the achievement of all students.

2.2. Sampling

Sampling of the research consists of 80 (22-23 years old) students taking developmental psychology and physiological psychology courses in Department of Psychology, Al-Zahra University. Reason of

selecting this sample was based on students' background. All of the students in the sample are registered according to their scores of entrance examination. So they had nearly same scores and cognitive levels. Randomly selected classes of A and B, both including 40 students, are considered as control group (class A) and as experimental group (class B). Class B includes 40 girls and Class A includes 40 girls. Al-Zahra University is one of the popular state universities in Iran. According the governmental laws in Iran, only female students can attend in this university.

In the beginning of the experimental work, to determine difference in academic achievement between experimental and control group students, a self-prepared achievement scale (developmental psychology and physiological psychology courses) was administered to both groups. Scores obtained is shown in Table 1.

Table1. Pre-test scores of experimental and control groups

Groups and courses	N	Mean	SD
Developmental psychology			
Experimental	40	9.19	1.40
Control	40	9.09	1.33
Physiological psychology			
Experimental	40	9.04	1.74
Control	40	9.04	1.53

Note: N stands for number and SD stand for standard deviation

Table 1 indicates that there is no significant difference on average achievement points for experimental and control group students. Hence, it is found that prior to the research; Developmental psychology and Physiological psychology topics achievement of students at both groups were almost equal.

3. Measurement

3.1. Developmental psychology topics achievement scale (DPTAS):

In order to get an answer for the first question, "Developmental Psychology Topics Achievement Scale (*DPTAS*)" which was developed by the researcher, was used. This scale aims to measure academic achievement of students. During the development of the scale, firstly 40 multiple choices questions were prepared. These questions aimed to measure objectives and behaviors determined by the researcher regarding Developmental Psychology subjects. Following the needed corrections, carried out by four specialists, the number of questions was reduced to 35 and the first draft of the scale was formed. For analysis of comprehensibility and solution time, the scale was answered by eight faculty members of psychology department. Taking the recommendations that came out, the corrections were made and finally the scale was prepared for reliability measurement. Reliability was carried out by administering to eleven students excluding sampling group. Following the reliability study, 5 questions with low distinctiveness were excluded from the scale. Final form of the scale, includes 30 multiple choices questions, has a KR-20 reliability coefficient of 0.77.

3.2. Physiological psychology topics achievement scale (PPTAS):

In order to get an answer for the second question, “Physiological psychology Topics Achievement Scale (PPTAS)" which was developed by the researcher, was used. This scale aims to measure academic achievement of students. During the development of the scale, firstly 40 multiple choices questions were prepared. These questions aimed to measure objectives and behaviors determined by the

researcher regarding Physiological psychology subjects. Following the needed corrections, carried out by four specialists, the number of questions was reduced to 33 and the first draft of the scale was formed. For analysis of comprehensibility and solution time, the scale was answered by eight faulty members from department of psychology. Taking the recommendations that came out, the corrections were made and finally the scale was ready for reliability measurement. Reliability study of the scale was carried out by administering to eleven students excluding sampling group. Following the reliability study, 3 questions with low distinctiveness were excluded from the scale. Final form of the scale, includes 30 multiple choices questions, has a KR-20 reliability coefficient of 0.69.

3.3. Implementing Teaching Sequence in the Classroom

All the students from the two classes were taught by the same faculty member. The faculty member, who implemented cooperative learning in the experimental group, had 22 years' experience. Moreover, he was experienced on active learning, he adapted the study easily. It is clear that just placing students in groups and expecting them to work together doesn't promote cooperation and learning (Burcin and Leman, 2007).

In this study, teaching according to STAD was used in the experimental group. This instruction focused on face to face interaction and aimed to help students recognize the conflict between their existing concepts and scientific concepts, and to provide them with the opportunity to learn the correct ones. Students in the groups were encouraged to decide who would be the leader, recorder, timekeeper and reflector. All the activities were completed by students under the guidance of the faculty member. While students were discussing in their small groups, the faculty member visited all the groups and asked some guiding questions to lead students in an appropriate direction.

All the cooperative groups prepared their own reports after the activities were completed and presented. In this way, the faculty member assessed whether they had acquired the learning objectives. Teaching was carried out for a period of 16 weeks at each group by researcher. The stages indicating teaching processes of cooperative learning in both groups are given below:

3.4. Experimental Group

3.4.1. Learning session:

1) Circulating Reading Passages (Approximate duration 5 min.): each student was given a reading passage.

2) Individual Studying on Reading Passage and Preparation of an Individual Question (Approximate duration 15 min.): In this stage, students studied on reading passages and prepared their individual questions. While preparing individual question, the students were warned that the prepared questions would be evaluated. The students were asked to produce questions for learning main concepts of the studied topic in the level of comprehension. At this process, the quality of each prepared individual question was evaluated.

3) Formation of Cooperated Groups Comprising Four Students (Approximate duration 5 min.): The groups were formed in a heterogenic style, taking achievement and social levels of students into account. For mission communion, summarizer, inspector, material supplier and writer tasks were assigned to students in the groups and they were asked give a group name.

4) Group Discussion and Preparation of Group (Approximate duration 10 min.): Evaluating individual questions and discussing on these, each group formed a group question. Then they wrote this question by defining groups name and members, on question section of question/answer card that was given to them. While preparing group questions, the students were also warned that the prepared questions would be evaluated. At this process, the quality of prepared group question was evaluated.

5) Answering the Received Questions by the Groups (Approximate duration 10 min.): Discussing the questions that they received, the

groups prepared answers and wrote these on answer section of question/answer card, also including group and member names.

6) Presentation of Answers in the Class and Discussion (Approximate duration 30 min,): Summarizer of each group presented the question and their answer to the class.

7) Teacher Explanations (Approximate duration 15 min,): After presentation of each group, class discussion was made for completing the missing and non-clear parts.

3.5. Control Group

3.5.1. Learning session:

The topics at learning session and the examples about the topics were explained by the researcher in control group. At that stage, the students participated in the courses by taking notes about the topics, listening and asking questions sometimes.

Table2. Academic achievement scores of experimental and control group

Groups and courses	N	Mean	SD	F	df	Sig.
Developmental psychology						
Experimental	40	17.21	2.02	254.30	1	0.009
Control	40	14.14	1.56	254.30	1	0.008
Physiological psychology						
Experimental	40	18.07	1.74	414.168	1	0.03
Control	40	15.26	2.33	414.168	1	0.02

Note: N stands for number, SD stand for standard deviation, F, DF and sig stands for F test, degree of freedom, and significance in turn

4. Results

As the f-value (254.30, 414.168) was significant at the $P< 0.01$, the two hypotheses are accepted according to table 2 and it is proved that cooperative learning (STAD style) has clear advantages concerning academic achievement of female students with respect to the conventional teaching relating Developmental psychology and Physiological psychology courses.

5. Discussion

This part of the paper focuses on interpreting and discussing fundamental outcomes of the research and implications. It is found that experimental group students taught by cooperative learning (STAD) are more successful than control group students in Developmental psychology and Physiological psychology courses. Many researches (Norman, 2005; Gillies, 2004; Keramati, 2007; Dollman, 2007; Gillies and Boyle, 2008) in line with the results of the present study also indicated that STAD can produce positive effects on academic achievement. For example Yang and Cheung (2002) state that cooperative learning has clear advantages concerning academic achievement of university students with respect to the conventional teaching.

According to Zafer and Mostafa research results (2008) and Burcin and Leman (2007), in line with the results of the present study indicated a clear significant difference, was detected in favor of the experimental group indicating the success of the cooperative learning in Developmental psychology and Physiological psychology courses. It means that the more students' works in cooperative groups, the more they understand, retain, and feel better about themselves and their peers and improve their academic achievement relating Developmental psychology and Physiological psychology courses. It seems working in a cooperative environment with focus on STAD style, encourages student responsibility for learning and increases student motivation by providing peer support. In this situation, students have opportunities to talk through the material, to explain it to each other and look at it in different ways. Giving and receiving information enhances student performance. As a result they a have a sense and achieve academic

achievement in Developmental psychology and Physiological psychology courses.

The findings of Faryadi (2007), Hanze and Berger (2007), Jacobs (2006), Willis (2007), and Yavuz, (2007) are also in line with the finding of this study. They stated that cooperative learning activities in the program were effective at increasing the leadership skill and enhance students' self-esteem and academic achievement through assigning roles for each member in the group to be responsible of his role, which in turn motivate students to participate in the learning process. But in conventional teaching students does not help each other to build a supportive community which raises the performance level of each member, this leads to lower self-esteem in students.

Gillies and Boyle (2008) displays that conventional teaching strategies have proven effective in decreasing motivation for learning, fostering negative feelings toward classmates, and decreasing performance on learning, effective in improving the students' academic achievement for many reasons: first, It does not give all students more chances to use their academic skills actively, promoted a negative attitude toward education and lower achievement. Second, it does not provided students with the relaxing positive teaching/learning environment, positive self-esteem, and responsibility for learning and more positive heterogeneous relationships. Third, it made students inactive most of the time because they do not asked to perform practical communicative tasks. So it does not promote involved and exploratory learning. Forth, it does not encouraged diversity in understanding, how to criticize ideas not people and decreasing self - management skills. Fifth, it does not connected students with their own personal life experiences, and thus, does not make learning more realistic to them.

Finally we can conclude that in a conventional teaching program, students and teachers are not in a state of dynamic interaction in the classroom. When students interact in cooperative groups, they learn to give and receive information, develop new understandings and perspectives, and communicate in a socially acceptable manner. It is through interacting with each other in reciprocal dialogues that students learn to use their various educational and moral skills differently to explain new experiences and new realities. One of the disadvantages of conventional teaching is using low status students will not participate and/or that high status students will take over the group. To solve this problem, teachers can create groups that are equitable so that all students participate as possible as they can, and use multiple-ability strategies, if cooperative learning is to work. In this regard students must be convinced of two things: different intellectual abilities are required in cooperative learning, that no one of student has all the abilities needed, but that each member of the group will have some of the abilities (Yang and Cheung, 2002). Sometimes one or two students in the group doing all the work, while the others sit relax.

So, it seems one way to encourage the participation of all group members is to hold everyone responsible for working with a task or a level of performance. Faculty members can do this by giving individual quizzes, by having each student to complete an individual worksheet or project. In addition, they have to circulate throughout the room, observing each group activity. In this way they can note problems, provide assistance, and keeping students dealing with a task in conventional teaching. Most students have little experience working in cooperative learning groups, and norm of the traditional classroom in conventional teaching method that are dramatically different from the norms of successful group work in both Developmental psychology and Physiological psychology courses. If faculty member wants his/her students to work together productively, he/she must plan to divide groups and preparing suitable tasks carefully, and teach students the new norms.

The results of this study indicated that STAD of the cooperative learning styles can help faculty members to let more learners, participate actively in the class. Cooperative learning is a way to organize classes, with the principal goal being to accelerate the achievement of all students. This approach operates on the principle that students work together to learn and to become responsible for their teammates learning as well as their own. Also cooperative learning emphasizes on having team goals and success dependent on the learning of all group members (Norman, 2005).

However, finding of this research stated in non-cooperative classrooms, in which conventional teaching are used faculty members often talk most of the time and only a few of the brightest learners have the opportunity to participate, usually by responding to the teacher. So, it is found that experimental group students taught by cooperative learning are more successful than control group students taught by conventional teaching. At this point, it is found that cooperative learning helped students to develop some of their educational and psychological skills, because the cooperative activities encouraged students to interact freely and communicatively and consequently increasing their academic achievement in Developmental psychology and Physiological psychology courses to a higher level. But it seems conventional teaching hardly improves the teaching of concepts and academic achievement.

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