

Full Length Research Paper

The effects of peer teaching on the university students' achievements in cognitive, affective, psychomotor domains and game performances in volleyball courses

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This study is related to one of the teaching models, peer teaching which is used in physical education courses. The fundamental feature of peer teaching is defined "to structure a learning environment in which some students assume and carry out many of the key operations of instruction to assist other students in the learning process". The aim of this study was to examine the effects of peer teaching on the university students' achievements in cognitive, affective, psychomotor domains and game performances in volleyball courses. The quasi-experimental design was used in this study. The study involved seventy second and third grade students at Abant İzzet Baysal University (AIBU), the School of physical education and sport. The sample consisted of 46 males (% 65.7) and 24 females (%34.3) from the department of teaching physical education and department of coaching education. The data was collected by means of the volleyball achievement test, volleyball skills observation forms, attitudes towards volleyball course scale and game performance assessment instrument. The 3x2 (Treatment condition: experimental I, experimental II and control x Time: Pre/Post test) repeated measure analysis of variance and one way analysis of variance were used to analyze the data. Findings indicated that there was a significant time X group interactions for cognitive domain. The same age peer teaching group improved their cognitive scores over a time more than CWPT-PE group. On the other hand, there were no significant time X group interaction effects in psychomotor, affective domains and game performances. According to the results of the study, it can be concluded that using different instructional models in volleyball classes improved students' achievement in cognitive, psychomotor domains and game performance but not affective domain. The present findings mean that at the university level, both teacher centered and students centered teaching have similar effectiveness in domains of learning in volleyball course.

Key words: Peer teaching, cognitive domain, affective domain, psychomotor domain, game performance, volleyball.

INTRODUCTION

Physical education, which is an integral part of the general education curriculum (Pangrazi, 2007), has a

wide spectrum of effects from ensuring an individual's maintaining physical health and happiness to processing

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and structuring knowledge, gaining new interests, attitudes, habits and skills. Various teaching models and methods are used in physical education courses for enhancing students' knowledge, attitudes, habits and skills which aim to build an active life style with physical continuity (Pate et al., 1998).

Traditionally, most of the physical educators use a teacher-directed style of instruction or direct instruction model in their teaching. This model is achievement based and in this model teachers have a distinct set of learning goals in mind; present a model of a desired movement, skill or concept; and then organize student learning activities into segmented blocks of time, providing high rates of augmented feedback and encouragement as learners practice each task or skill (Metzler, 2005). The direct instruction model is effective for controlling crowded classes, high injuries risk subjects, initial stage of skill acquisition like command style (Mosston and Ashworth, 2009).

Beside direct instructional model, physical educators also use other models such as peer teaching (Metzler, 2005; Rink, 2006) in their classes. The model is also called as peer assisted teaching (Siedentop and Tannehill, 2000), reciprocal teaching (Mosston and Ashworth, 2009) and peer tutoring (Ernst and Byra, 1998). Peer teaching is defined as a process in which an educated skillful student teaches a knowledge or skill to several students in the same grade level under the guidance of a teacher (Doğanay, 2007). Peer teaching is also defined as the acquisition of skill and knowledge through active help and support among status equals (Topping, 2005). In this model, a teacher student transfers knowledge to their peer in a classroom setting under the control of an adult teacher.

Peer teaching is based on Bandura's social learning theory, Piaget's cognitive development theory and Vygotsky's social constructivism theory (Iserbyt et al., 2011). This theoretically based model of instruction has positive effect on cognitive development of a student (Hogan and Tutge, 1999; Metzler, 2005). The results of Iserbyt, Madou, Vergauwen and Behets (2011)'s study demonstrated that the peer teaching is effective for enhancing positive teaching-learning atmosphere. And, it is useful for developing the responsibility, communication, self-confidence and socialization of the students (Loke and Chow, 2007). As reported by Loke and Chow (2007) peer teaching is effective than adult teaching since students reported that peers understand their problems about teaching better than teachers. Furthermore, peer teaching makes students active participants, giving them more responsibility and promoting their level of engagement in the task (Nurmi et al., 2013). Peer teaching also improves social interaction, helps to gain a habit to trust others, and provides the fast learning possibilities (Lund, 1997).

The effectiveness of peer teaching is also investigated in psychomotor domain. There is a strong evidence to

support its effectiveness. For example, peer teaching is effective for improving the percentage of correct performance of skills (Crouch et al., 1997, Johnson and Ward, 2001; Ward et al., 1998), increasing academic learning time for visually impaired students in physical education (Wiskochil et al., 2007, cited in Ayers, 2009), improving motor skills learning (2011, Virgilio, 1985.). Several factors affect the effectiveness of peer teaching such as age, the nature of task, ability level of learner and teacher students, motivation level of students for cooperation, institutional and cultural support to cooperation (Hogan and Tutge, 1999). Generally, peer teaching is suggested for 4th and 5th grade with modification, as age increase the modification requirement level is decreased (Metzler, 2005). The ability level of the teacher students is also important in peer teaching. If learners study with a more competent teacher student, they usually get higher benefits but if they study with an equivalent competent or less competent teacher student, they get benefits at a lower level (Hogan and Tutge, 1999; Longueville et al., 2002). Beside these factors, training and preparing level of peers are critical for the success of the peer teaching (Cervantes et al., 2013). Cervantes et al. (2013) reported that trained teacher student tend to have greater impact on the motor performance of the students as compared to untrained teacher student since inadequately trained teacher student may be unable to manipulate the task, or successfully manage personal interactions with the peers. The communication among peers is another important factor to contribute the effectiveness of peer teaching. Students should not be paired with students who make them feel uncomfortable. This may be having an adverse effect on their ability to interact in an honest and mutually beneficial manner (Townsend and Mohr, 2002).

Most of the previous studies on peer teaching in physical education were on the disabled students or students with developmental disability (Houston-Wilson et al., 1997; Ward and Ayvazo, 2006; Webster, 1987;), elementary school (Ward and Ayvazo, 2006; Ward et al., 1998), middle school (Ayvazo and Ward, 2009; Iserbyt et al., 2011; Mascret, 2011) and high school (Butler and Hodge, 2001; Ernst and Byra, 1998; Johnson and Ward, 2001). Within our knowledge, there are no studies on university students. Thus, in this study the effectiveness of peer teaching was tested on university students. In addition, the present study was aimed to test the effectiveness of peer teaching on three domains of learning -cognitive, affective and psychomotor-. The effectiveness of peer teaching on three domains of learning was not investigated together in the previous studies. Generally, previous studies in physical education mostly focused on motor skill learning (Ayvazo and Ward, 2009; Iserbyt et al., 2011; Longueville et al., 2002; Ward and Ayvazo, 2006; Ward et al., 1998). In the literature there are different forms of peer teaching in physical education classes such as unidirectional (one on one)

peer tutoring, reciprocal peer tutoring, cross age peer tutoring, same age peer tutoring and class wide peer tutoring (Cervantes et al., 2013). In this study, class wide peer tutoring (CWPT-PE) and same age tutoring model were selected as an instructional strategy to compare the effectiveness of them. Because one form includes the using of task cards and the other does not and these two strategies are reported as effective. For example, CWPT-PE has a positive effect on improving cooperation in a group (Cooper et al., 1987 cited in Bollough et al., 2003), increasing academic achievement level of the students with developmental problems in physical education courses and developing appropriate class behaviors (Cohen et al., 1982; Walberg, 1990; Ward and Lee, 2005).

Furthermore, Johnson and Ward (2001) reported that CWPT was effective in increasing correct trial number in striking unit in 3rd grade students. They also found that CWPT-PE was effective in increasing motor performance in low and high skilled boys and girls. Ayvazo and Ward (2009), in their study, examined the effect of CWPT-PE on the performances of students in volleyball unit and found that it caused an improvement in 75% of total trial and correct trial of students. In this study the effectiveness CWPT-PE and same age peer teaching with and without using task cards compared to each other and also their effectiveness compared with direct instructional model. Within our literature search, there is no attempt to compare these two strategies with each other in terms of three domains of learning. Thus, the purpose of this study was to examine the effects of two different forms of peer teaching on the university students' achievements on cognitive, affective, psychomotor domains in volleyball course and volleyball game performances.

METHODOLOGY

Participants

The study involved seventy second and third grade male and female university students from the school of physical education and sport. The sample consists of 46 males (% 65.7) and 24 females (%34.3) from the department of teaching physical education and department of coaching education. Students who took the volleyball courses during 2011 to 2012 fall semester voluntarily participated to this study. Seventy participants in three different volleyball courses were assigned to three experimental groups -same age peer teaching, CWPT-PE, direct instructional model-. The same age peer teaching group (experimental group 1) consists of 20 third grade students ($n_{\text{female}}=8$, $n_{\text{male}}=12$, $M_{\text{age}}=22.58\pm 2.23$) from the department of teaching physical education. The class wide peer tutoring group (experimental group 2) consists of 25 third grade students ($n_{\text{female}}=5$, $n_{\text{male}}=20$, $M_{\text{age}}=22.89\pm 2.44$) department of teaching physical education. 25 ($n_{\text{female}}=11$, $n_{\text{male}}=14$, $M_{\text{age}}=23.28\pm 2.34$) second and third grade students in the department of coaching training were consider as direct instructional model group (control group). Students in peer teaching groups and direct instructional group had no previous experiences with peer teaching but they had experiences with direct instructional model. The volleyball course was required course for students in the department of teaching physical education but it was an elective course for the students in the department of coaching

training. Students had to attend 80% of classes.

Data collection instruments

In this study, four different data collection instruments were used. These instruments are explained below:

Volleyball achievement test: Volleyball Achievement test which was developed by researcher was used to measure the knowledge of the students on volleyball. The test consists of 30 multiple choice questions for measuring critical behaviors in volleyball. The achievement test was developed based on the table of specifications of the volleyball courses. 60 items were written preliminary and these 60 items were examined by two volleyball experts, one measurement and evaluation expert and one curriculum development expert. Afterwards, necessary corrections were made based on the feedback and the form was applied to 100 students having taken the course before. After the items analysis which item discrimination index were 0.30 and higher and the items with item difficulty index at medium strength (0.40-0.60) which were believed to distinct the students who know and don't know were chosen and the final test was obtained. The final form of achievement test consisted of 30 items with five choices; of which 13 were on knowledge level, 8 on comprehension level, 7 on application level and 2 on analysis level. The average difficulty of test was 0.58 and KR-20 reliability coefficient was 0.87. Volleyball achievement test was used as an indicator of cognitive domain in this study.

Attitudes toward volleyball course scale: "Attitudes toward Volleyball Course Scale" (Mirzeoğlu, 2000) was used to measure the volleyball attitudes of the students. The scale is a Likert type scale and scored as 1 "Certainly Disagree" and 5 "Certainly Agree". The scale is a single dimension scale with 28 items; 14 of the items consist of positive and 14 consist of negative statements. Cronbach alpha internal consistency coefficient of test was .88. The higher scores on the scale indicated favorable attitudes toward volleyball. The scale was used as an indicator of affective domain in this study.

Volleyball skills observation forms: The observation forms developed by the researcher. These forms were used for assessing the basic volleyball skills (overhead pass, forearm pass, service, spike and block) and also were used as indicators of psychomotor domain in the present study. Observation forms include critical behaviors at various numbers for each skill and these behaviors were ranked as 1 "Never", 2 "Rarely", 3 "Sometimes", 4 "Frequently" and 5 "Always".

During the development stages of forms, forms were examined by two volleyball coaches and a volleyball instructor at the university and the necessary corrections were made based on their feedback. In this study, observer reliability was determined. For observing reliability, skill practices of all students participating in the study were recorded as both pretest and posttest and assessments were made by using observation forms by three experts, namely the researcher, the volleyball instructor at the university and the volleyball coach. The observer reliability among the pretest scores by the three experts for volleyball skills were examined and, as a result of the one way variance analysis (ANOVA), no significant difference was found among the observers in skills in psychomotor domain and in total score ($F_{(2-209)} = 1.548$, $p=.215$). Based on the findings, the reliability among the observers can be said to be high in psychomotor domain

Game performance assessment instrument (GPAI): "Game performance assessment instrument (GPAI)" developed by Oslin et al. (1998) to measure game performance behaviors that demonstrate

tactical understanding, as well as the student's ability to solve tactical problems by selecting and applying appropriate skills (Memmert and Harvey, 2008). Volleyball game performance assessment instrument measures game performances by coding the behaviors during the game. It not only shows choosing appropriate skills during the game but also tactical awareness and tactical ability to solve tactical problems. Game performance assessment instrument gives researchers the opportunity to observe and code the compatibility of behaviors in three different categories consisting of decision making, skill execution and adjustment (Pritchard et al., 2008). In the present study, decision making category consisted of criteria such as skills used in reception and the landing zone after reception, type of pass used by the setter in setting, offense type of the attacker, and block type of blocker etc.

Skill execution category consists of efficient execution of selected skills such as overhead pass, forearm pass, service, spike and block skills. The player gets a positive (effective) score for each skill in line with the game rules and gets a negative (ineffective) score for each position the ball is carried, thrown or out. Adjustment category consisted of criteria such as a player's following the ball, setter's getting prepared to set the game after reception and moving towards the ball, opening of spiker's to spike, if not spiking taking position for coverage and moving to the front of the net to block etc (Memmert and Harvey, 2008).

In order to determine the game performances of the students, teams were set pre and after study, the students played matches and the matches were recorded in camera. Afterwards, the matches were shown to three experts in volleyball and each student was given points through tally by using observation forms prepared based on the decision making, skill execution and adjustment components. Individual index was prepared for each student and the scores of the students were calculated for three categories, game performance and game involvement by use of the necessary formulas. The procedure for observer reliability was same as observation forms. Data analysis for observer reliability indicated no significant differences in components of the game performance (decision-making $F_{(2-209)} = .098$, $p=.907$; skill execution $F_{(2-209)} = 1.406$, $p=.252$; adjustment $F_{(2-209)} = .003$, $p=.997$; game performance $F_{(2-209)} = .496$, $p=.611$ and game involvement $F_{(2-209)} = 1.267$, $p=.288$) among observers.

Data collection procedure and experimental design

The quasi-experimental design, (inequivalent design with control group) was used in this study. Seventy participants who took volleyball course were assigned to same age peer teaching (Experimental Group 1), Class wide peer tutoring (Experimental Group 2), and direct instructional model group (Control Group).

Volleyball course was selected in this study. There are several reasons for choosing volleyball course in this study. First, because of the competency of the researcher, volleyball was chosen. Second, the university students who participated in this study did not take any regular volleyball course prior to this class. Third, volleyball has relatively discrete task with clear start and finish of movement, which allows students to observe clearly the presence or absence of a critical elements (Ayvazo and Ward, 2009).

In each groups, the volleyball course was given by the same instructor for 100 minutes, 4 hours a week for 12 weeks based on predetermined course syllabus (As shown in Table 1). The instructor is an experienced person who played volleyball in the different volleyball teams for many years, who also works as a volleyball referee and has been teaching at the university for 10 years. The instructor and researcher have doctoral degree for teaching physical education. At the beginning of the study, the instructor was informed about peer teaching by the researcher and short practices were made on implementation of syllabus. Also, the

researcher had weekly meetings with the instructor and informed the instructor about the general course outline. The details about the groups are given below:

Experimental group 1 (Same age peer teaching): The same age peer teaching model was applied in the first experimental group. For the application of the model, two students taking the course were chosen for each course (100 minutes) to teach and each student was assigned to teach twice during the whole semester. After making the necessary preparation, the selected students met the researcher and instructor two days before the course. In this meeting, the instructor gave the information to teacher students about the learning objectives, expectations of them, task presentation and check for understanding, how to communicate errors to learners, how to provide praise appropriately, how to practice safely, how to assess the mastery of students as suggested by Metzler (2005). After all the information about implementation was given to the teacher students, the daily plan was done by the instructor and teacher students altogether. After that, the explanations and presentations about the exercises were provided to the teacher students in practice by the researcher and the instructor. In the classroom setting, students were divided into two groups which includes 9-10 students and the same syllabus was implemented to peers by two different teacher students. Meanwhile, the instructor observed the teacher students during the course and intervened the process by calling the teacher students to talk when necessary. The instructor definitely had no direct contact with the other students in the classroom. During the course, the teacher students were responsible for explaining and demonstrating the subject of the course, explaining and demonstrating the exercises, providing feedback, corrections and reinforcer. In this group, the task cards were not used for teaching volleyball.

Experimental group 2 (Class wide peer tutoring): Experimental group 2 was thought by class wide peer tutoring strategy. The class wide peer tutoring was applied with regard to suggestion of Johnson and Ward (2001). Based on the suggestion of Johnson and Ward (2001) CWPT-PE consists of six components which are teams, peer dyads, practice time and task cards, partner check, posting team scores and goal setting. By considering this suggestion, the students were divided into groups of 4 students and each group named itself at the beginning of the semester. Then, in each group, 2 students in pairs gave the course using the task cards prepared by the researcher. In each course, the students in each group reviewed the task cards and set the total group points to be achieved during the exercises in the course and announced it on the board and practiced in pairs. One of the students acted as doer and the other as observer during practice and gave each other feedback/correction/reinforcer and assessed peer's performance on the task card. Then, they changed duties. After the assignments, point of each student was summed and the final group score was calculated by summing the points of all students in the group. The score in total and the score planned to be achieved before the practice were compared and the final score was written on the board (Townsend and Mohr, 2002). The same process was applied to all the subject in volleyball, and the groups getting the highest two scores in all subjects were given the opportunity to have a match over 3 sets in the final course of the semester.

Control group (Direct instructional model): The volleyball courses in the control group were taught by the traditional direct instruction model. During the course, the instructor explained and demonstrated the subject by use of visual-audio instruments (power point presentation, video etc.), question-answer technique and then applied the exercises from simple to difficult. The instructor point presentation, video etc.), question-answer technique and then applied the exercises from simple to difficult. The instructor

Table 1. Contents of volleyball course in experimental and control groups.

Time	Content
Week 1	Achievement test, attitudes scale, video record of skills (pretest)
Week 2	Video record of tournament-match performance (pretest)
Week 3	Volleyball game rules, dimensions of playing area, locomotor movements in volleyball
Week 4	Overhead pass
Week 5	Overhead pass – forearm pass
Week 6	Forearm pass
Week 7	Service
Week 8 to 9	Spike
Week 10	Block
Week 11	Block, rolling
Week 12	Defense in volleyball (reception and coverage)
Week 13	Offense in volleyball (game systems and coverage)
Week 14	Match
Week 15	Achievement test, attitude scale, video record of skills (posttest)
Week 16	Video record of tournament-match performance (posttest)

Table 2. Comparison of attitude scores of the students in different groups towards the volleyball course.

Group	N	Pretest		Posttest		Group x Time F	p	η^2
		M	SD	M	SD			
Experimental I	20	4.12	.306	3.90	.626			
Experimental II	25	4.20	.350	4.01	.489	.271	.763	.008
Control	25	4.32	.383	4.00	.696			

controlled the starting and finishing time for exercises, set the time and tempo for exercises at the beginning of teaching the new skill. Then, instructor provided different exercise drills to students and students had an opportunity to select some of them and practiced these drills independently. The students were observed during the exercises and feedback/correction and reinforcer were given by the instructor. During the semester, main skills and tactics of volleyball were given and, in the last week (4 hours), the students had a volleyball match. In this study the direct instructional model was applied based on the suggestion of Rosenshine. Rosenshine in 1986 identifies six key operations in a direct instructional lesson: 1. Review of previously learned material, 2. Presentation of new content/skills, 3. Initial student practice, 4. Feedback and correctives, 5. Independent practice and 6. Periodic review (cited in Metzler, 2005).

Data analysis

The descriptive statistics, two factor (3x2: Group: Experimental I, Experimental II and Control /Time: Pretest-Posttest) repeated measure analysis of variance and one way analysis of variance analysis (ANOVA) were used to analyze data. Tukey Post Hoc test was used as follow up test. To test the initial differences in all variables among three groups, One way analysis of variance (ANOVA) was conducted. ANOVA results indicated no significant differences in the level of knowledge on volleyball ($F_{(2-69)} = 1.265$,

$p = .289$), the level of attitude towards volleyball course ($F_{(2-69)} = 1.851$, $p = .165$), the skills consisting volleyball in all and in total ($F_{(2-69)} = .828$, $p = .441$) and all sub-dimensions in consisting the game performance (decision making $F_{(2-69)} = .842$, $p = .436$; skill execution $F_{(2-69)} = 2.293$, $p = .110$; adjustment $F_{(2-69)} = .913$, $p = .407$; game performance $F_{(2-69)} = 2.297$, $p = .109$ and game involvement $F_{(2-69)} = 2.585$, $p = .084$) among three groups. These results indicated that groups were equal in terms of variables at the beginning of the study.

FINDINGS

Changes in attitude towards volleyball (Affective domain)

3 x 2 Repeated Measure ANOVA results indicated significant time main effect for attitudes towards the volleyball course ($F_{(1-67)} = 9.040$, $p = .004$, $\eta^2 = .119$). On the other hand, the group main effect ($F_{(2-67)} = .941$, $p = .396$, $\eta^2 = .027$) and the group x time interaction effect were not significant ($F_{(2-67)} = .271$, $p = .763$, $\eta^2 = .008$). In all groups, attitude scores were decreased from pre to post test (Table 2), but these changes were not differ among groups.

Table 3. Comparison of levels of volleyball knowledge of the students in different groups.

Group	N	Pretest		Posttest		Group x Time F	p	η^2
		M	SD	M	SD			
Experimental I	20	13.20	3.53	23.20	5.40			
Experimental II	25	14.44	3.76	20.72	6.14	3.99	.023	.107
Control	25	12.60	4.92	21.88	5.23			

Table 4. Comparison of volleyball skill levels of the students in different groups.

Skills	Group	N	Pretest		Posttest		Group x Time F	p	η^2
			M	SD	M	SD			
Overhead Pass	Experimental I	20	2.36	.56	3.83	.50	1.438	.245	.041
	Experimental II	25	2.54	.57	3.79	.41			
	Control	25	2.45	.66	3.87	.54			
Forearm Pass	Experimental I	20	2.08	.60	3.89	.44	1.405	.253	.040
	Experimental II	25	2.21	.61	3.91	.42			
	Control	25	2.20	.73	3.79	.43			
Service	Experimental I	20	2.60	.70	3.92	.55	.044	.957	.001
	Experimental II	25	2.55	.67	3.87	.54			
	Control	25	2.43	.72	3.79	.57			
Spike	Experimental I	20	1.91	.70	3.43	.75	.439	.847	.013
	Experimental II	25	2.03	.75	3.48	.5			
	Control	25	1.99	.59	3.36	.79			
Block	Experimental I	20	2.03	.53	3.44	.80	2.637	.079	.073
	Experimental II	25	1.65	.49	3.44	.70			
	Control	25	1.77	.73	3.29	.66			
Total	Experimental I	20	2.20	.44	3.07	.48	.202	.817	.006
	Experimental II	25	2.20	.53	3.70	.46			
	Control	25	2.17	.59	3.62	.51			

Changes in volleyball achievement scores (Cognitive domain)

Analysis indicated significant difference in knowledge scores ($F_{(1-67)} = 219.49$, $p=.000$, $\eta^2 = .766$) between pre and posttest. Besides, group x time interaction effect was also significant for the knowledge scores ($F_{(2-67)} = 3.99$, $p=.023$, $\eta^2 = .107$). The change in knowledge scores over 12 week period differed among three groups (Table 3). One way analysis of variance was conducted to find out which groups had more changes over 12 week periods. Analysis indicated that Experimental Group I ($M_{\text{gain}}=10.00$) improved their knowledge scores more than Experimental Group II ($M_{\text{gain}}=6.280$).

Changes in volleyball skills (Psychomotor domain)

Results of 3 x 2 Repeated Measure Analysis of Variance

indicated significant time main effect for each volleyball skills. However, group main effect and group x time interaction effects were not significant for volleyball skills. Analysis indicated that achievement scores of overhead pass ($F_{(1-67)} = 625.707$, $p=.000$, $\eta^2 = .903$), forearm pass ($F_{(1-67)} = 1015.098$, $p=.000$, $\eta^2 = .938$), service skills, ($F_{(1-67)} = 385.393$, $p=.000$, $\eta^2 = .852$) spike skill ($F_{(1-67)} = 552.289$, $p=.000$, $\eta^2 = .892$), block skill ($F_{(1-67)} = 498.274$, $p=.000$, $\eta^2 = .881$) improved from pretest to post test (Table 4). In addition, total scores of students ($F_{(1-67)} = 1449.946$, $p=.000$, $\eta^2 = .956$) improved over 12 weeks. The improvement in volleyball skills did not differ with regard to intervention groups.

Changes in game performance

Analysis indicated significant differences in decision making $F_{(1-61)} = 34.78$, $p=.000$, $\eta^2 = .363$; skill execution

Table 5. Comparison of volleyball game performances of the students in different groups.

Sub-dimensions	Group	N	Pretest		Posttest		Groupx Time F	p	η^2
			M	SD	M	SD			
Decision making	Experimental I	20	2.13	2.37	6.10	3.90	1.448	.243	.045
	Experimental II	25	2.76	2.72	5.08	1.44			
	Control	25	1.81	2.27	3.95	2.73			
Skill execution	Experimental I	20	1.20	2.06	4.00	3.64	1.657	.199	.052
	Experimental II	25	1.65	1.93	3.54	2.85			
	Control	25	.58	.63	1.70	1.18			
Adjustment	Experimental I	20	.64	.48	3.82	2.83	2.090	.132	.064
	Experimental II	25	.75	.84	3.52	2.85			
	Control	25	.47	.67	2.19	1.99			
Game Performance	Experimental I	20	1.27	1.46	4.61	2.92	2.274	.112	.069
	Experimental II	25	1.72	1.42	4.04	2.39			
	Control	25	.88	.95	2.61	1.63			
Game Involvement	Experimental I	20	31.50	14.85	51.30	18.57	1.183	.313	.037
	Experimental II	25	33.18	14.12	44.64	16.33			
	Control	25	23.64	15.42	38.18	17.19			

$F_{(1-61)} = 26.43$ $p = .000$, $\eta^2 = .302$; adjustment $F_{(1-61)} = 73.22$, $p = .000$, $\eta^2 = .546$; game performance $F_{(1-61)} = 64.32$, $p = .000$, $\eta^2 = .513$ and game involvement $F_{(1-61)} = 47.53$, $p = .000$, $\eta^2 = .438$) subscales of Game Performance Assessment Instruments between pretest and posttest (Table 5). In addition, analysis revealed significant differences in skill execution ($F_{(2-61)} = 5.44$, $p = .007$, $\eta^2 = .151$), game performance ($F_{(2-61)} = 34.78$, $p = .000$, $\eta^2 = .363$) and game involvement ($F_{(2-61)} = 3.53$, $p = .035$, $\eta^2 = .104$) subscales among three groups favoring experimental groups. The same age peer teaching and CWPT-PE had improved their scores in three subscales of game performance more than direct instructional model group. On the other hand, the group x time interaction was not significant for any subscales of game performance assessment (Table 5).

DISCUSSION

Peer teaching is one of the learner centered approaches in modern education today. Therefore this study intended to examine the effects of two different types of peer teaching on the students' achievement in cognitive, affective and psychomotor domain in volleyball course at the university level. In this study the effectiveness of peer teaching was tested by comparing it with direct instruction model focusing on teacher centered approach.

In consistent with expectation of this study, students' attitudes toward volleyball decreased over 12 weeks period in all three teaching models. This result could be attributed to classroom atmosphere in which mostly focused on skill development and was mostly structured instead of fun and freedom. The lack of experiences with

peer teaching and taking the responsibility of course may cause feeling of worry in experimental group I and II and this may have an influence on attitudes. Especially, having more experiences with teacher centered applications, not having much responsibility for learning, having to prepare for learner centered applications, being spending time for their responsibilities before and during the course, observing by the instructor during the course may influence the attitudes of students in a negative way. Generally students want to have a fun in physical education classes, structuring the physical education classes may decrease their enjoyment, fun and influence their attitudes.

In Loke and Chow (2007)'s study, some students reported negative opinion about peer teaching such as they reported that taking responsibility of course is stressful process for them. It is interesting to note that the changes in attitudes toward volleyball did not differ with regard to instructional model. This finding was not in line with the some of previous studies which reported an improvement in socialization and communication (Iserbyt et al., 2011; Loke and Chow, 2007; Temple and Lynnes, 2008) after peer teaching. The differences between the findings of this study and those of other studies may have stemmed from the fact that other studies were mostly carried out on disabled students, on different age groups and based on different features measuring the affective domain.

The findings on the cognitive domain revealed that volleyball knowledge of students improved over 12 week period and this improvement differed in terms of type of instructional model. Especially, students in the same age peer teaching group improved their knowledge scores more than students in CWPT-PE group. However, the

improvement in knowledge scores of learner centered groups was not different than direct instructional group. This result means that teaching volleyball either in teacher centered or learner centered approaches made no difference in terms of volleyball knowledge. Students who received instruction on volleyball by same age peer teaching model improved their knowledge about rules, techniques, and tactics of volleyball. But, the effect of same age peer teaching on knowledge about volleyball might arise from the using of task card in the course. Because, in CWPT-PE group used task cards in every lesson during the study, and most of the students met the task cards as a teaching material for the first time. So, this reason might create the difference between two groups in cognitive domain. The research on the effect of peer teaching on cognitive domain in the physical education teaching is limited. The finding of this study was not in line with the previous study of Arun et al. (2010) who reported no significant improvement in cognitive domain after teaching the volleyball course with peer model. However, Clarke and Fetham (1990) stated that peer teaching process improved learning skills which contributed higher academic achievement. (cited in Loke and Chow, 2007). According to Griffin and Griffin's study, peer teaching has no measurable effects on academic achievement of students but they find it useful for students to learn through course materials used during peer teaching process (cited in Loke and Chow, 2007).

Another finding of this study revealed that volleyball courses given in twelve weeks were effective in students' learning the volleyball skills. This was an expected result because the drills about the skills during the course with the objective, the number of drills, repetitions and time yielded such a result in all three groups. This result is supported by the results of Arun et al. (2010) and Iserbyt et al. (2011). Arun et al. (2010) found significant time differences in overhead pass and forearm pass skills. In addition, Iserbyt et al. (2011) tested the effect of peer teaching model using task cards for teaching tennis unit in 8th grade physical education courses and they reported that the students peer teaching groups have learnt tennis motor skills as much as the students in the group with teacher centered tennis course did.

CONCLUSION

In this study, there were no differences in volleyball skills among the experimental and control groups and also changes in volleyball skills over time did not differ in terms of instructional model. This finding was not parallel with the previous studies (Ayvazo and Ward, 2009; Johnson and Ward, 2001; Longueville et al., 2002; Ward and Ayvazo, 2006). The study carried out by Longueville et.al. (2002) to teach breaststroke turning to 48 students in a high school examined the effect of peer teaching with inexperienced and experienced teaching students on the

swimming performances and achievement motivations of the students.

The study revealed that teaching students with a high level of teaching skills increased the performances of male students at the highest level while teaching students with a medium level of teaching skills were effective on female students who were inexperienced in swimming. Ward and Ayvazo (2006), in the study about autistic children at preschool, used the class wide peer teaching model and found that the model increased accurate catch and total catch scores of the children. Similarly, Johnson and Ward (2001), in their studies designed on a shoot unit with the participation of 11 students in the third grade with the use of class wide peer teaching, reported a decrease in the total trial scores but an increase in the accurate trial and rate. Another study carried out by Ayvazo and Ward (2009) examined the effect of class wide peer teaching model on the volleyball performance of the 6th grade students and found that the class wide peer teaching model resulted in an increase in total trial and accurate trial performances of the three students among 4 students. Among the reasons for the differences between the study and other studies can be use of different age groups and different sport branches in the studies, attendance of disabled students in the studies and use of class wide peer teaching model as peer teaching.

In the present study, the effect of same age peer teaching and class wide peer teaching on the game performance of the students in the volleyball tournament was also examined. According to the findings obtained from the tournament, significant time differences were found in game involvement and the sub dimensions of game performance such as decision making, skill execution, adjustment and the game performance. According to the result, it is possible to state that skill exercises and tactical practices in volleyball courses given in all three groups had a positive effect on improving the performances of the students in the game. When the game performance scores of the students in the experimental and control groups in the study were compared, there was a significant difference in favor of the experimental groups in skill practice and game participation sub dimensions. The skill practice category consists of the volleyball skills and the skills included in the study. The player gets a positive (effective) score for each skill in line with the game rules and gets a negative (ineffective) score for each position the ball is carried, thrown or out. In this respect, the students in peer and class wide peer teaching groups (experimental I and II) achieved more than the students in the control group in terms of applying the volleyball skills during the match. This result is very important because students take responsibility in each other's' learning and assessment in peer teaching groups and they also learn the skills they teach while they fulfill their responsibilities. Although there was no significant difference among the groups when the volleyball skill

performances were assessed separately, high skill performance of the students in the groups where peer teaching was applied during the match is a situation intended because the skills consisting of a sport field are learnt to practice in a game setting. For this reason, display of skills in a game setting should be more valuable than displaying each skill in a controlled setting. The finding on the participation in game, which is another dimension of game performance, indicated a significant difference in favor of the peer teaching group (experimental I) over the direct instructional model group. According to the result, the students who were assigned duties beforehand and whose skills were improved in the peer teaching group participated in the game more than the ones in the control group did. In peer teaching, the students learnt how to read a game, participate in the game properly and display appropriate performance in a volleyball match while they taught their classmates the volleyball knowledge and skills. This finding was an expected result because individuals learn best when they teach others. When the findings of the game performance are assessed altogether, it is possible to state that the game performances of the students in the volleyball course given in different models improved significantly compared to the beginning level and the game performance improved more in the classes where peer learning was applied.

This study has some limitations. First, the study was carried out with restricted number of university students from intact volleyball class and students were not randomly assigned to the experimental groups and control group. Future studies should be conducted on the different age groups with increasing sample size, and random assignment. The effectiveness of peer teaching should also be investigated in other fields of physical education such individual sports. Second, the sample of this study included both males and females and the study did not consider possible gender differences. The female-male balance could not be ensured since the study was carried out in a real school setting and on the students enrolled in the volleyball course. In the future studies the effectiveness of peer teaching should be examined by considering gender as a confounding variable. Third, this study did not consider the ability level of student teacher in peer teaching. The future studies may provide the suitable conditions and focus on the effect of peer teaching applied to students with different levels of teaching ability. Fourth, the study quantitative and nature of data did not provide detail information about the subjective experiences of students with different instructional models. In the future studies, both qualitative and quantitative methods could be used.

By considering the limitations of this study, it can be concluded that using different instructional models in volleyball classes improved students' achievement in cognitive, psychomotor domains and game performance but not affective domain. In addition, the different

instructional models influence the university students' achievement in the different domains in a similar way. The present findings mean that at the university level, both teacher centered and student centered teachings have similar effectiveness in domains of learning. From practical point of view, the instructors should carefully design instructional model in their class and select the model based on the need and interest of students. The teacher should also consider the nature of task, ability level of students for choosing and application of models.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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