# Pairing Learners in the Reciprocal Style of Teaching: Influence on Student Skill, Knowledge, and Socialization

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In the past decade, peer tutoring, one of several collaborative learning strategies used in classroom settings, has been documented extensively in the literature (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986; Fuchs, Fuchs, Bentz, Phillips, & Hamlett, 1994; Pumfrey, 1986). Within the scheme of peer tutoring, students work in pairs to support each other's learning. This teaching method, first introduced in the early 19th century (Salmon, 1932), has been shown to be an effective system of instruction for promoting students' cognitive and social learning (Byrd, 1990; Katstra, Tollefson, & Gilbert, 1987; Olson, 1990). Findings from research on peer tutoring suggest that increases in learner achievement are related to the increase of individualized instruction, opportunity to respond, and provision of specific feedback (Delquadri et al., 1986; Fuchs et al., 1994). Under certain circumstances, researchers have found peer tutoring to be more effective in fostering student learning than conventional methods of instruction (Anania, 1983; Russell & Ford, 1983; Sharon, 1980).

The effects of gender, ability, and friendship on learner processes and outcomes in dyadic peer tutoring schemes have been examined in several studies conducted in classroom settings. Cloward (1967) and Mevarech (1985) found no significant effects of mixed gender pairings on doer achievement in reading and math. Same gender combinations were found to be as effective as mixed gender combinations for the doer. In a study of same age tutorial systems in reading, male-male tutorial combinations were found to be good for both the doer and observer, female-female combinations better for the observer than the doer, and mixed gender pairings better for the observer than the doer (Topping & Whiteley, 1988).

Ehly and Larson (1976) reported that type of gender pairing (same and mixed) and learner ability pairing (same and mixed) were not predictive of student spelling outcomes or tutorial process variables. However, the observer's liking of the doer was found to be predictive of observer-doer interaction. This 'liking' finding supports the research of Little and Walker (1968) who found learner 'likeableness' to be correlated significantly with outcome achievement of the doers in dyadic systems.

In summary, the classroom literature indicates that pairing by gender and ability has little effect on learner processes and outcomes in peer tutoring schemes. In contrast, learner likeableness seems to have a significant effect on learner process and outcome variables.

In physical education one of the most commonly employed peer tutoring structures is the reciprocal style of teaching (Mosston & Ashworth, 1994). Within the reciprocal style of teaching the teacher plans instruction to meet skill performance objectives as well as social objectives specific to learners working together. In this style learners are paired;

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while one learner (doer) performs the task, the other learner (observer) provides specific feedback to the doer based on information provided by the teacher in the form of a task sheet. For example, Melissa observes Jonathon striking a foam ball with a paddle against the wall. After observing his performance, she says, "nice job, I like how you are snapping your wrist; it would help to have your left foot forward at the point of contact." When the doer completes the task(s), the doer and the observer switch roles. Besides providing the learners with the tasks to be performed and task sheets which are designed to improve the quality of feedback to be provided to the doer, the teacher is responsible for observing the actions of both the doer and observer, and interacting with the observer.

Many strengths are realized in the reciprocal style of teaching. First, students learn to give feedback to a peer. Siedentop (1991) suggests that this will result in a higher number of correct responses by the doer because of the increased frequency of feedback provided by the observer. Some findings about the provision of feedback by physical education teachers support his contention (Pellett & Harrison, 1995; Rikard, 1991; Rink & Werner, 1987; Werner & Rink, 1989). In the reciprocal style of teaching, positive and corrective feedback specific to the critical skill cues of the task is provided by the observer immediately following each task performance. Second, students learn to give and receive feedback with a peer, which Mosston and Ashworth (1994) suggest results in an expansion of learner socialization skills. Fostering an environment where peers are at ease with one another seems critical in movement settings because much of what occurs in these settings (e.g., games) involves interaction between two or more individuals. Third, students learn to perform as well as analyze movements in the reciprocal style of teaching. By observing the performance of the doer, comparing the performance against the criteria, drawing conclusions about the accuracy of the performance, and giving appropriate feedback, the observer better understands the process of learning a task (Mosston & Ashworth, 1994; Siedentop, 1991).

Although many assets are realized in the reciprocal style of teaching, this style is not without liabilities. First, and most noticeably, practice time is reduced per learner as a result of one learner giving feedback to another. The number of skill practices that a learner might normally complete in another teaching style is reduced by approximately one-half. For example in the practice and self-check styles, learner focus is on performing skills, not assessing a partner. Therefore, the learners have more opportunity to be physically engaged in the tasks at hand in the practice and self-check styles when compared to the reciprocal style. Second, the possibility of giving incorrect feedback is increased because each learner is responsible for giving his/her partner specific task-related feedback. This is an important issue as incorrect feedback may be more detrimental to a learner's skill performance than no feedback. Third, opportunity for conflict between learners is increased given the social-emotional nature of the reciprocal style of teaching. Fourth, the opportunity for learners to engage in small-talk, that is, conversation about anything but the task at hand, is increased. As with any instructional approach, teachers must address these liabilities, among others, when employing the reciprocal style of teaching.

Motor skill performance and social relationships between peers and the conditions for immediate feedback have been examined in several studies in physical education in which the reciprocal style of teaching was employed. The results from a series of three studies incorporating Mosston and Ashworth's (1994) practice, reciprocal, and inclusion teaching styles revealed that fifth grade children were able to perform a

hockey accuracy task in a naturalistic type setting equally well when taught in each of these three styles (Goldberger, Gerney, & Chamberlain, 1982; Goldberger, 1983). The reciprocal style was found to enhance social development on those behaviors related to giving and receiving feedback from a peer (Goldberger et al., 1982). Children of average and exceptional aptitude for learning motor skills performed equally well when taught in the reciprocal style.

Within the framework of the reciprocal style of teaching, Byra and Marks (1993) examined the effect of pairing learners by ability level (high, low, and mixed) and companionship (friend and non-acquaintance) on learner provision of feedback and comfort level giving and receiving feedback. The results indicated that the observers provided specific feedback more frequently to doers who were identified as friends than doers identified as non acquaintances, and that the doers felt more comfortable receiving feedback from a friend than a non acquaintance. Learner ability level did not seem to affect the amount of specific feedback provided by the observer or the doer's comfort in receiving feedback.

## Significance and Purpose of the Study

Little is known about how a physical educator might best facilitate student learning (physical, cognitive, and social) in the reciprocal style of teaching. The study described herein was conducted because of a lack of research on student pairing techniques and subsequent learner outcomes specific to the reciprocal style of teaching in physical education. The purpose of this study was to examine the effects of pairing learners by skill ability on student motor skill performance, cognitive performance, and perceptions about working with a partner in a junior high school physical education setting.

Of major significance to the field of physical education is whether there are differences in student learning when students are paired with partners who are of differing skill ability levels in the reciprocal style of teaching. Findings related to student learning may provide insight on more effective means of pairing learners for peer teaching.

## Methods and Procedures

*Participants and Setting*

A total of 60 junior high school students (6th, 7th, 8th, and 9th graders) from one school volunteered to participate in this study. The group was comprised of 30 females and 30 males, 15 at each grade level. The majority of the learners were middle class Caucasians. Consent for student participation in this study was provided by parents or guardians.

The students in the treatment group were taught by the same teacher who had three years teaching experience in physical education. This teacher was trained in the appropriate use of Mosston and Ashworth's (1994) teaching styles, with particular emphasis on the reciprocal style of teaching. A score of 96% was achieved on a written exam specific to the Spectrum of Teaching Styles in a university graduate level course (Models of Teaching). In addition, the teacher had taught a number of lessons to elementary-aged learners using each of Mosston and Ashworth's five didactic teaching styles (command, practice, reciprocal, self-check, and inclusion). Having one teacher provide all of the instruction for the two classes in this study helped to control for unplanned variability in the teacher factor.

For eight 35-minute lessons 48 of the participants (treatment group) received instruction on juggling in the reciprocal style of teaching, while 12 received no instruction (control group). The 48 learners who received instruction were divided into two classes. One class was comprised of the 6th and 7th graders and the other was comprised of the 8th and 9th graders. The stu-

dents were provided opportunities to juggle scarves, bags, and balls during the eight lessons. The skill of juggling was utilized because it was a novel task to the subjects. None of the subjects had received formal instruction in juggling prior to the study.

All instruction took place in the gymnasium used by the students during their regularly scheduled physical education classes. The gymnasium could accommodate comfortably up to 40 junior high school learners at one time.

*Skill and Knowledge Tests*

Prior to the instructional phase of the study all 60 subjects were pretested and posttested on (a) their ability to perform a juggling task and (b) their knowledge of juggling. Pretesting was conducted for two purposes: (a) to determine the learner's level of skill and knowledge prior to receiving instruction, and (b) to pair learners during the treatment phase of the study. Following the treatment phase of the study all of the subjects were posttested to determine the effects of the treatment on learner skill and knowledge performance.

*Skill test.*

During the pre and posttests the learners were instructed to juggle three jugglebags as many times as possible. Each learner was given the following instructions: (a) you will be performing a juggling skill test; (b) you will juggle with all three bags and will be allowed three trials; and (c) a trial will begin with the first toss of a bag and ends with the first drop of a bag. Each subject was tested with the same three juggle bags. All of the testing was conducted by one investigator and videotaped for subsequent analysis. The videotape recorder was placed in a position such that a frontal view of the performer was taped.

Each subject's best trial (greatest number of juggles) was assessed for the number of catches made (outcome) and the number of skill elements demonstrated (technique). The number of catches made during this trial were tallied and one point was awarded for each catch made. The total number of catches made represented the subject's skill outcome score.

Each subject's best trial was also assessed for the presence of the following five skill elements (technique): (a) the first bag was thrown from the hand holding two bags; (b) palms were facing up; (c) eyes were on the bags, not the hands; (d) the bags were tossed at the same height; and (e) the bags were caught with alternate hands. All of these skill elements were easily observable. One point was awarded for each skill element demonstrated, allowing for a total possible technique score of five points.

A teacher who had taught juggling for 10 years was consulted and assisted in the selection of this skill test. The teacher chose this test because she felt that it would differentiate high and low ability jugglers. In a pilot study involving 5th and 6th graders ($n = 20$), low and high ability jugglers were distinguishable. Based on the results from the pilot study, the researchers believed that the learners in the present study could be accurately categorized into high and low ability groups.

To assess coding biases and reliability, two trained coders coded each subject's pre and posttest "best skill trial" twice. Training of the coders was completed in two stages. In the first stage the coders learned to assess juggling by observing 10 different students juggle. This was conducted under the supervision of a trainer. In the second stage the coders coded 10 different students as they each juggled three implements for 15 seconds. The coders' scores were then compared to those of the trainer. If agreement was 90 percent or higher for each of the 10 codings, coder training was complete. If agreement was less than 90 percent, the second stage of the program was repeated.

Coder training was completed in approximately four hours.

Intraobserver percentage of agreement scores of 90 and 92 were yielded for the pretest scores and 92 and 94 for the posttest scores. Interobserver percentage of agreement scores of 92 and 94 were yielded for the pretest and posttest scores, respectively.

*Knowledge test.*

The subjects were also pre and posttested on their knowledge of juggling. After viewing a 15-second videotape of a juggling demonstration, the subjects were asked to answer the following questions: (a) what "things" are being performed well by the juggler?; and (b) what might the juggler do to improve his/her performance? Three minutes after viewing the videotaped segment, the subjects viewed the same segment a second time. They were then given two additional minutes to complete their written answers. All of the subjects completed this task as a group within their regular physical education class.

The students' written responses from the pre and post knowledge tests were analyzed using qualitative data reduction techniques (Patton, 1990). In the analysis, the learners' pre and posttest responses to the two questions posed were analyzed separately. The initial step in the analysis was for two coders to read the subjects' written statements for the purpose of identifying common elements across the data. In the second step the coders grouped the written responses according to these common elements and reread the statements to arrive at a consensus for category descriptors. In the third step the two coders independently categorized all of the statements according to the category system developed.

To assess coding biases and reliability, the two trained coders coded each subject's pre and posttest written responses twice. Intraobserver percentage of agreement scores of 88 and 90 were yielded for the pretest scores and 88 and 94 for the posttest scores. Interobserver percentage of agreement scores of 90 and 92 were yielded for the pretest and posttest scores, respectively.

*Learner Pairings*

The 15 male and 15 female students receiving the highest pretest skill scores were classified as high-skilled, while the 15 male and 15 female receiving the lowest scores were classified as low-skilled. After randomly assigning six high (three male and three female) and six low-skilled students (three male and three female) to the control group, the remaining 48 students (treatment group) were randomly assigned to a partner of similar ability, high with high (HH; n = 12) or low with low (LL; n = 12), or a partner of different ability (HL/LH; n = 24). An equal number of males and females were assigned to each of the pairing conditions. Although the classes were coed, pairing by same gender was utilized because the learners had worked with partners of the same gender in their regular physical education class more frequently than with partners of the opposite sex. Once assigned a partner, each pair remained together for the extent of the study.

*Treatment*

Those learners (n = 48) randomly assigned to the treatment group practiced specific juggling tasks within the framework of Mosston and Ashworth's (1994) reciprocal style of teaching. Learners were paired; while one learner juggled (doer), the other observed (observer) and provided feedback based on criteria that were presented on a task sheet. Once the juggling task was completed, the pair reversed their roles.

Each lesson began with a short introduction of the subject matter followed by a warm-up (5 to 10 minutes). Then an episode in the reciprocal teaching style was delivered. At the beginning of this episode the

teacher explained and demonstrated the task(s) to be completed and reviewed the roles of the doer, observer, and teacher with the learners. Then the students were provided an opportunity to practice and refine the presented juggling task. In completing the roles of doer and observer, the subjects refined their juggling skills through practice and feedback. Graham, Holt/Hale, and Parker (1993) define skill refinement as providing cues or tips to help the learner perform the skill more efficiently.

Task sheets were incorporated during each reciprocal episode. Included on the task sheets were instructions on how to complete the juggling task, space for recording results, and examples of positive specific and corrective specific feedback statements (see Figure 1).

Student skill and role behavior was reviewed during lesson closure. The teacher restated the objectives of the reciprocal teaching style and gave the group general feedback about their task performance and the roles of doer and observer.

**Task and Criteria Sheet**
**Reciprocal Teaching Style**
**Juggling - Scarves**

Name (doer 1) _____
Name (doer 2) _____
Class _____
Date _____

Instructions to the student:

**To the doer:** Juggle the scarves for approximately 15 seconds (check clock on wall *to determine time). Stop and rest. Listen while the observer provides feedback.* Complete this same task (15 second juggling followed by rest and feedback) three more times.

**To the observer:** Analyze the doer's form by comparing the performance to the criteria listed below. Offer feedback about what is done well and what needs to be corrected. Circle YES or NO for each task criterion listed below after the doer has completed the task.

| Task Criteria | Doer 1 | | Doer 2 | |
|---|---|---|---|---|
| 1. Are the hands and palms down when *the scarves are tossed into the air?* | Yes | No | Yes | No |
| 2. Are you "clawing down" with the hands when catching the scarves? | Yes | No | Yes | No |
| 3. Are your eyes on scarves? | Yes | No | Yes | No |

**Examples of feedback statements:**
1. Try to keep your eyes on the scarves at all times
2. Make sure you use the "claw down" motion to catch the scarves.
3. You did a nice job keeping your hands and palms down during the toss.

**Figure 1.** Reciprocal teaching style criteria task sheet for juggling scarves.

All lessons were audio- and videotaped. The audio- and videotapes were used to determine the level of match between the teacher's behaviors and the reciprocal style of teaching.

*Postlesson Questionnaire*

A postlesson questionnaire was administered to discover how the learners perceived working with a partner in the reciprocal style of teaching. Following each of the eight lessons the subjects in the treatment group were instructed to respond to four statements (see Figure 2). A 7-point semantic-differential scale was employed to answer each statement. The scale consisted of three positive points, three negative points, and one neutral point. A semantic differential scale involves the rating of concepts using bipolar adjectives. These adjectives represent opposite meanings (e.g., good-poor, strong-weak, etc.) with scales anchored at the extremes. The semantic differential scale was used to determine feelings or attitudes (Safrit, 1990). Nunnally (1978) stated that the evaluation factor of the semantic-differential scale serves as a definition of attitude, and responses to this factor's adjective pairs are excellent measures of verbalized attitudes. The learners' semantic-differential scale scores were directly employed to determine how the subjects felt about working with a partner in style C.

*Teaching Style Verification*

Style implementation during the study was verified through systematic observa-

Statements and Bipolar Adjective Pairs

1. In today's lesson I felt comfortable giving feedback to my partner.
   comfortable 1 2 3 4 5 6 7 uncomfortable
2. In today's lesson I felt comfortable receiving feedback from my partner.
   comfortable 1 2 3 4 5 6 7 uncomfortable
3. In today's lesson I felt that my partner gave me "good" feedback.
   good 1 2 3 4 5 6 7 poor
4. In today's lesson I felt that I gave my partner "good" feedback.
   good 1 2 3 4 5 6 7 poor

**Figure 2.** Post-lesson questionnaire form.

tion. A modified version of the Reciprocal Style Analysis Checklist (Sherman, 1982) was employed to verify the fidelity between teacher and learner behaviors and teaching style (see Figure 3). Decisions that the teacher and learners make during a reciprocal style episode are presented on the analysis checklist. The decision-maker for each statement is listed in the margin. While observing a reciprocal style episode, the coder checks those decisions made by the correct party. Decisions that are not made or made by the incorrect party are not checked.

Two trained coders coded each of the eight lessons twice to assess coding biases and reliability. Training of the coders was completed in two stages. In the first stage the coders learned to analyze reciprocal style teaching episodes by coding 10 episodes under the supervision of a trainer. In the second stage the coders analyzed 10 more reciprocal style teaching episodes independently. Each style analysis checklist was then compared to the experts' results. If agreement was 90 percent or higher for each of the 10 codings, coder training was complete. If agreement was less than 90 percent, the second stage of the program was repeated. Coder training was completed in approximately six hours.

Intraobserver percentage of agreement scores of 94 and 96 were yielded for the eight lessons by the two coders. An interobserver percentage of agreement score of 92 was yielded for the eight lessons.

**Reciprocal Style Analysis Checklist**

**Phase One: Role Identification**
Teacher 1. Locates learners for introductory ceremony.
Teacher 2. Names the teaching style.
Teacher 3. States the purpose of the teaching style.
Teacher 4. Identifies the triad and describes its structure and function.
Teacher 5. Describes the roles of the doer, observer, and teacher.

**Phase Two: Subject Matter Identification**
Teacher 6. Announces the general subject matter (objectives).
Teacher 7. Announces the specific task(s).
Teacher 8. Delivers task to learners (show and tell).
Teacher 9. Establishes quality and quantity of task performance.
Teacher 10. Establishes order of task performance.
Teacher 11. Delivers the criteria (explains what a criteria is and how to use it).
Teacher 12. Establishes parameters and logistics for the task.
Teacher 13. Provides and explains task sheet.
Teacher 14. Asks questions for task and/or role clarification.
Teacher 15. Announces: Select a partner; decide who will be doer/observer, then begin.

**Phase three: Performance of the Task**
Learner 16. Selects a partner.
Learner 17. Decides who is first doer and observer.
Learner 18. Makes impact decisions within established parameters.
Learner 19. Performs the task.
Learner 20. Switches roles of doer and observer.

**Phase Four: Evaluation and Feedback**
Learner 21. Has the task sheet.
Learner 22. Monitors the task performance.
Learner 23. Compares and contrasts task performance against criteria.
Learner 24. Draws conclusions about accuracy of task performance.
Learner 25. Offers task-related feedback to doer.
Learner 26. Initiates communication with the teacher, if necessary.
Teacher 27. Moves around classroom visiting each pair of learners.
Teacher 28. Responds to communications initiated by the learner.
Teacher 29. Reminds learners about details of task and roles, if necessary.
Teacher 30. Offers role-related feedback to observer and doer.
Teacher 31. Makes episode adjustments when deemed necessary.

**Phase Five: Closure**
Teacher 32. Locates learners for closure.
Teacher 33. Summarizes main points of episode.
Teacher 34. Provides role-related feedback to learners based on objectives of the reciprocal style of teaching.

**Figure 3.** Reciprocal teaching style-analysis checklist (Sherman, 1982).

## Data Analysis

*Skill performance.*

Analysis of covariance (ANCOVA) was used to analyze the posttest scores of each skills test (outcome and technique) for group members. This analysis was conducted to discover whether certain pairing patterns were superior to others in terms of producing student learning. The independent variable was treatment and the covariate was the pretest scores of students for each score. The dependent variable was the adjusted posttest scores of students for each skill. A separate 5 x 2 (group x test) repeated measures analysis of variance (ANOVA) was used to examine student learning from pretest to posttest for each skills test. A .05 level of significance was employed in all analyses.

*Knowledge test.*

The students' written responses from the pre and post knowledge tests were analyzed using qualitative data reduction techniques (Patton, 1990). Three categories emerged as a result of the data reduction technique employed. These categories were (a) skill technique, (b) skill outcome, and (c) unknown. Statements describing elements of the skill movement (i.e., what the learner did during skill execution) were labeled *skill technique*. Examples include, "he had his palms up; he alternated hands on the tosses; and, his actions (hand movements) were rhyth-

mic." Statements describing what the learner saw as a result of the juggling movement were labeled *skill outcome.* The following are examples of statements grouped within this category: "he used three bags; he caught the bags over 10 times; and, he didn't drop any bags." When students didn't identify an answer, their responses were grouped within the don't know category which was labeled as *unknown.* Frequency counts were calculated for each category within each question for the four treatment groups and control group. Group means and standard deviations were subsequently calculated for the emergent categories.

Analysis of covariance (ANCOVA) was used to analyze the posttest scores of each knowledge category for group members. This analysis was conducted to discover whether certain pairing patterns were superior to others in terms of producing student learning (knowledge). The independent variable was treatment and the covariate was the pretest scores of students for each category. The dependent variable was the adjusted posttest scores of students for each category. A separate 5 x 2 (group x test) repeated measures analysis of variance (ANOVA) was used to examine student learning from pretest to posttest for each knowledge category. A .05 level of significance was employed in all analyses.

*Postlesson Questionnaire.*

A separate 4 x 8 (group x lesson) repeated measures ANOVA was used to determine the extent of influence of the treatment (independent variable) on the questionnaire scores (dependent variable) for each of the four questions answered by the students over the eight lesson unit. This analysis was conducted to discover whether certain pairing patterns produced different perceptions about working with a partner. A .05 level of significance was employed in the analysis.

## Results

*Skill Performance*

The subjects' posttest outcome and technique scores were analyzed separately using ANCOVA. The adjusted posttest means for each test and group are presented in Table 1. Significant differences in adjusted posttest means were revealed amongst groups for the outcome scores, $F(4,49) = 3.14$, $P<.02$; and technique scores, $F(4,49) = 11.94$, $P<.01$. Scheffé post hoc tests for skill outcome revealed that students in the HH, HL, and LL groups scored significantly higher on their posttest than did those in the LH and control groups. Scheffé post hoc tests for skill technique revealed that students in the HL, LL, and LH groups scored higher on their posttest than did those in the HH and control groups.

Pretest and posttest means for the outcome and technique skill scores are presented in Table 2. A 5 x 2 (group x test) repeated measures ANOVA revealed a significant interaction between treatment groups and test administrations for the outcome, $F(4,55) = 7.21$, $P>.01$, and technique skill scores, $F(4,55) = 11.49$, $P<.01$. Post hoc analysis (Scheffé) for skill outcome revealed

Table 1
Adjusted Posttest Means for Juggling Skills Tests by Subject Group

| Groups | | Skill Performance | |
|---|---|---|---|
| Doer | Observer | Outcome | Technique |
| High | High | 5.39 | 4.19 |
| High | Low | 5.51 | 4.64 |
| Low | Low | 4.11 | 4.64 |
| Low | High | 2.96 | 5.10 |
| Control | | 2.37 | 3.27 |

Note. Outcome scores are total number of catches made in the best trial, while technique scores are the number of skill elements demonstrated in the best trial.

Table 2
Means and Standard Deviations for Juggling Skills Tests by Subject Group

| Groups | | Outcome Scores | | | | Technique Scores | | | |
|---|---|---|---|---|---|---|---|---|---|
| Doer | Observer | Pretest | | Posttest | | Pretest | | Posttest | |
| | | M | SD | M | SD | M | SD | M | SD |
| High | High | 2.92 | (2.97) | 6.17 | (4.82) | 4.25 | (0.87) | 4.58 | (0.79) |
| High | Low | 5.58 | (4.62) | 9.67 | (5.35) | 4.17 | (0.93) | 4.92* | (0.29) |
| Low | Low | 0.42 | (0.51) | 2.50* | (1.51) | 3.17 | (1.27) | 4.50* | (0.90) |
| Low | High | 0.88 | (0.39) | 1.75* | (0.87) | 2.33 | (0.49) | 4.67* | (0.65) |
| Control | | 0.75 | (0.75) | 1.08 | (0.67) | 2.75 | (0.75) | 3.00 | (0.95) |

Note. Outcome scores are total number of catches made in the best trial, while technique scores are the number of skill elements demonstrated in the best trial.

* Significant difference from pretest to posttest ($p<.05$).

a significant improvement from pretest to posttest for the LL and LH treatment groups, and no significant improvement for the HH, HL, or control groups. Scheffé post hoc tests for skill technique revealed a significant improvement from pretest to posttest for the HL, LL, and LH treatment groups, and no significant improvement for the HH or control groups.

*Knowledge Performance*

The students' written responses from the pre and post knowledge tests were categorized according to the following labels, (a) skill technique, (b) skill outcome, and (c) unknown. Pretest and posttest means and standard deviations are presented in Table 3.

The subjects' posttest scores for the three categories were analyzed separately using ANCOVA. Significant differences in adjusted posttest means were revealed amongst subject groups for the category labeled skill technique, $F(4,49) = 12.40$, $P><.01$. Scheffé post hoc tests for skill technique revealed that students in the HH, HL, and LL groups scored significantly higher on their posttest than did those in the LH and control groups. No significant results were found for the categories labeled skill outcome or unknown.

A 5 x 2 (group x test) repeated measures ANOVA revealed a significant main effect for groups for those responses labeled skill technique, $F(4,55) = 5.09$, $P<.02$ Scheffé post hoc tests revealed a significant increase in the number of skill technique statements reported from pretest to posttest for the HH, HL, and LL groups, but not for the LH or control groups. No significant results were found for the categories labeled skill outcome or unknown.

Table 3
Means for Knowledge Test by Subject Group

| Groups | | Categories | | | | | |
|---|---|---|---|---|---|---|---|
| | | Skill Technique | | Skill Outcome | | Unknown | |
| Doer | Observer | Pretest | Posttest | Pretest | Posttest | Pretest | Posttest |
| High | High | 1.08 | 2.67* | 0.58 | 0.83 | 0.67 | 0.25 |
| High | Low | 1.33 | 4.17* | 0.50 | 0.08 | 0.25 | 0.17 |
| Low | Low | 1.50 | 4.08* | 0.67 | 0.17 | 0.25 | 0.25 |
| Low | High | 0.33 | 0.83 | 2.17 | 1.17 | 0.50 | 0.67 |
| Control | | 1.08 | 1.00 | 0.67 | 0.67 | 0.50 | 0.42 |

* Significant difference from pretest to posttest ($p<.05$).

*Postlesson Questionnaire*

Group mean scores for the four questionnaire statements are represented in Figures 4-7. Learner perceived comfort giving feedback to and receiving feedback from a partner was similar across the four treatment groups. Mean scores ranged between 1.25 and 3.08 for giving feedback (see Figure 4) and between 1.25 and 2.67 for receiving feedback (see Figure 5). Similar findings were revealed for perceived value of feedback given and feedback received. Mean scores ranged between 1.33 and 3.00 for giving feedback (see Figure 6) and 1.17 and 3.00 for receiving feedback (see Figure 7). The mean scores indicate favorable learner perception towards comfort and value related to giving and receiving feedback. No significant differences were revealed for

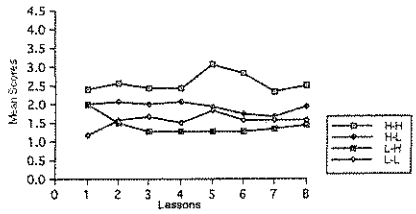


**Figure 4.** Learner perceived comfort giving a partner feedback.

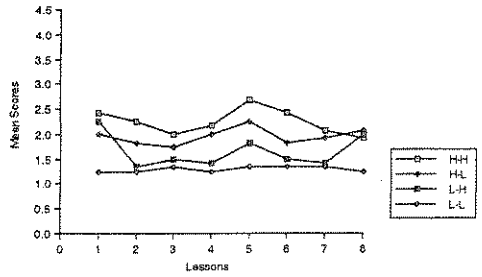


**Figure 5.** Learner perceived comfort receiving feedback from a partner.

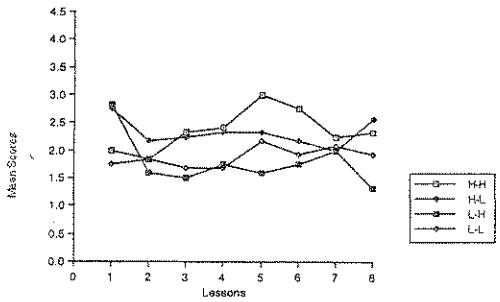


**Figure 6.** Learner perception of value of feedback given to a partner.

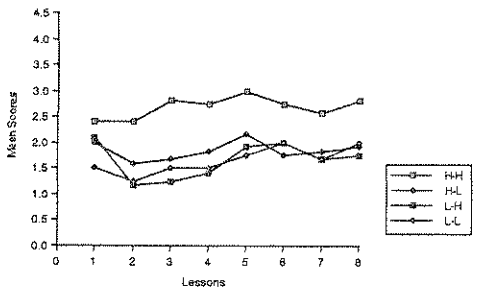


**Figure 7.** Learner perception of value of feedback received from a partner.

subject groups across the eight questionnaire administrations for any of the four post-lesson questionnaire statements.

## Discussion

*Skill Performance*

The low-skilled learners showed significant improvement from pretest to posttest for both skill technique and skill outcome regardless with whom they were paired (i.e., a high or low skilled partner). The high-skilled learners who were paired with low-skilled learners improved significantly from pretest to posttest only for skill outcome. Those high-skilled learners who were paired with other high-skilled learners showed no significant change in skill performance from pretest to posttest. Students assigned to the control group did not improve from pretest to posttest. These results suggest that instruction presented within the framework of the reciprocal style of teaching can have a positive effect on student skill learning, particularly for lower skilled performers.

These findings, however, also beg the question, why the differences in skill performance between the low and high ability pairings? There are several plausible answers to this question. One may be related to the skill tests employed. The scoring systems were bound at the upper end. Given that the higher ability learners scored higher in the pretest than the lower ability learners, the higher ability learners had less opportunity to improve in the posttest. It is likely that this created a ceiling effect for the high ability learners regarding possible gains for skill technique and outcome.

A second reason may be associated with giving and receiving feedback. Perhaps the feedback given to the high ability learners was inappropriate for their level of performance or simply just wasn't provided in a great enough quantity to help generate a change in performance. In a study of low and high-skilled student's striking ability, Rikard (1991) found that the high-skilled students decreased their performance after receiving teacher feedback while the low-skilled students improved their performance. Although Rikard's study involved teacher feedback, not peer feedback as in the present study, the findings from both studies related to the high-skilled learners seem to have some similarities.

A third reason may be related to the amount of time that the high ability learners were engaged in the activity. It may be that higher ability learners require more time to demonstrate change in a movement pattern than lower ability learners.

Mixed findings were revealed when examining the data for the pairs' skill technique and outcome scores. First, low ability learners who received feedback from high ability learners were unable to make as many consecutive juggles as the other learners; however, they were clearly able to demon-

strate correct technique as well as the other learners. Second, high ability learners who received feedback from other high ability learners didn't score as high on skill technique. This result may be related to these subject's higher scores on the pretest.

Given these findings, it doesn't seem possible to provide a definitive answer about the influence pairing by ability level has on learner skill performance (outcome and technique) in juggling. Improved performance was observed across all of the treatment groups in at least one of the two skill areas, and some groups made greater gains than other groups. However, to say a particular type of pairing technique (specific to skill ability) is better than another at this time would not be warranted. Further research is needed in other activity areas (e.g., volleyball, badminton, etc.) with different classes of school-aged learners. The results found in the gymnasium setting parallel the mixed findings reported in the classroom literature for peer teaching (Ehly, 1987; Ehly & Larson, 1976; Lysynchuk, Pressley, & Vye, 1990).

*Knowledge Performance*

Three of the four treatment groups (HH, HL, and LL) showed significant change from pretest to posttest for written responses that were labeled skill technique. These subjects made a greater number of comments about the technical elements of the movement during the posttest than the pretest (e.g., "He needs to catch with his palms up; He needs to keep his eyes looking forward."). The number of responses from the LH subjects increased as well, but not significantly. No change was evident in the responses from those subjects who received no instruction. Assuming that knowing more about skill technique represents an increase in one's knowledge, it seems plausible to suggest that instruction presented within the framework of the reciprocal style of teaching can have a positive effect on student knowledge of subject matter.

One of the objectives associated with the reciprocal style of teaching is that of providing the conditions of immediate feedback (Mosston & Ashworth, 1994). When analyzing their partner's skill performance, the observers (a) observed their partner's performance, (b) compared and contrasted the performance against set criteria, (c) drew conclusions based on their analysis, and (d) communicated the results to their partner in the form of positive specific or corrective specific feedback. The findings specific to the responses labeled skill technique suggest that to engage in the process of giving and receiving feedback is beneficial to a student's understanding of the movements required to successfully juggle.

The posttest results revealed that the HH, HL, and LL pairings scored significantly higher on the posttest (responses related to skill technique) than did the pairings in the LH and control groups. Given these results, observer ability level seems to have little impact on learners' knowledge gains. To say that a particular type of pairing technique (i.e., pairing specific to skill ability) is better than another is not supported in terms of learner knowledge gains.

*Perceptions*

Results from the four questionnaire statements indicate that working with a peer was a positive experience for all subjects. The mean scores for each of the four questions ranged between 1.17 and 3.08 on a seven-point likert scale (see Figures 4-7). These findings suggest that the students valued giving feedback to and receiving feedback from a partner. In addition, they were comfortable in their role giving feedback to and receiving feedback from a partner.

Although no significant results were revealed for the questionnaire statements, an interesting pattern emerged. High ability students who were matched with partners of

high ability reported the largest scores across the four groups over the eight lessons. Of all the subjects, the HH students were least comfortable giving feedback to and receiving feedback from a partner. In addition, they valued the experience of giving and receiving feedback the least. It seems plausible to suggest that the HH students felt they knew the subject matter and thus perceived less value in providing and receiving feedback from a partner, and, in turn comfort giving and receiving feedback with a partner.

## Summary

Within the limitations of this study (i.e., 48 junior high level students performing juggling tasks) the students improved their performances from pretest to posttest regardless with whom they were paired. In addition the students indicated that they perceived working with a peer as a comfortable and positive experience, regardless with whom they were paired. This is important information to the physical educator who values outcomes that focus on the development of social relationships between peers and the conditions for immediate feedback. The data support the contention that skill and knowledge gains can transpire while engaging in the socializing process unique to this teaching style. If affective outcomes such as improving communication skills, working together, cooperating, and encouraging are desired in conjunction with psychomotor development, choosing the reciprocal style of teaching makes good sense.

For junior high students, being paired with a high or low-skilled peer seemed to have little affect on learner skill performance, cognitive understanding of skill execution, or comfort level giving and receiving feedback. The learners improved both their skill and understanding for juggling in an environment which they perceived to be comfortable and positive. The information gained from this study may help physical educators make better decisions when maximum partner interaction is desired in the gymnasium. When the goal is to encourage learners to give and receive feedback in a paired setting, junior high physical education teachers can allow students to choose a compatible partner, someone they regard as unthreatening and supportive, and not be concerned about the ability levels of the students. At the elementary level, Byra and Marks (1993) found that working with a companion was advantageous to giving feedback to a peer.

One of the themes that emerged from Portman's (1995) research, titled *Who is Having Fun in Physical Education Class* and involving low-skilled sixth grade learners, was "mostly nobody helps." The low-skilled learners in Portman's study perceived physical education as an unhappy experience in that their teachers and classmates spent little time interacting with them. Contrary to what these students are telling us, physical educators want their students to succeed in the gymnasium and enjoy their experiences. By engaging students in the socialization process unique to the reciprocal style of teaching (i.e., to give and receive feedback with a peer) learners are likely to feel more included than excluded from physical education class. In turn, they will likely experience success and have fun while developing their psychomotor and cognitive abilities, as supported by the findings from the presented study.

As with all studies, this study seems to raise as many questions as it answers. Questions that need to be addressed in future research include: (a) how much interaction goes on between high and low ability doers and observers in the reciprocal style of teaching?; (b) what is the quality of the interactions between high and low ability doers and observers in the reciprocal style of teaching?; and (c) how does type of activity affect student learning with high and low ability students in the reciprocal style of teaching? Much still remains to be learned

about pairing junior high school level learners in the reciprocal style of teaching.

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