Enhancing Performance and Skill Acquisition in Novice Basketball Players With Instructional Self-Talk

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This study examined the effectiveness of instructional self-talk on acquiring and performing three basketball skills (dribbling, passing, and shooting). Sixty-two young, novice players were organized into two groups. The experimental group accompanied the practice of three specific drills with self-talk. The control group performed the same drills traditionally. Six assessment sessions were completed. Repeated measures MANOVAs showed that experimental group participants performed better than their control group counterparts when dribbling and passing. Experimental group participants and their coaches reported using self-talk more when passing and dribbling and less when shooting. In addition, experimental group participants achieved significantly better dribbling and passing scores ($p < .05$) between assessment sessions. These results support instructional self-talk as an effective tool for skill acquisition and performance enhancement of skills low in complexity.

A revolution for the role that cognition plays in influencing thoughts and behaviors has been apparent in mainstream psychology, which, in later years, has also flourished in the sport context (Whelan, Mahoney, & Meyers, 1991). Cognitive strategies include active mental processes that have been designed to influence or modify existing thought patterns. One of the most widely used cognitive strategies, as reported by athletes, is self-talk (ST; Gould, Finch, & Jackson, 1993; Madigan, Frey, & Matlock, 1992). Athletes often talk to themselves while they train or compete. Sometimes this dialogue is audible, yet usually athletes talk to themselves covertly, a practice known as self-talk. According to Zinsser, Bunker, and Williams (1998), self-talk (ST) facilitates performance in various ways, such as skill acquisition, building confidence and self-efficacy, modifying ineffective...
habits, as well as controlling effort. Nideffer (1993) also suggested that ST "results in a redirection of attention to task relevant cues" (p. 552).

In general, ST can take the form of praise (positive), criticism (negative), or neutrally toned, task-related instruction (Moran, 1996). Positive ST assists athletes in staying appropriately focused in the present, not dwelling on past events and mistakes or projecting too far into the future. ST producing inappropriate, irrational, counterproductive, or anxiety-provoking thoughts has been labeled as negative ST (Weinberg, 1988). Negative thinking directs the athletes’ attention to thoughts of failure and doubt, which have been associated with poorer performances. Negative ST also reflects overanalyses, self-doubt, and inappropriate questions that interfere with the athletes’ performance (Zinsser, et al., 1998). On the other hand, neutral ST, instructional in purpose, has been associated with concentration on specific tasks or goals and with stress coping capabilities (Hendrix, 1994). An explanation that Hendrix offers is that athletes become focused on the task, thus do not have the time to create inappropriate thoughts.

ST is a cognitive strategy that has been identified as a valuable technique for performance enhancement by various sport psychologists (Gould, Tammen, Murphy, & May, 1989; Halliwell, 1989; Nideffer & Sagal, 1998), coaches (Gould, Hodge, Peterson, & Giannini, 1989; Weinberg, Grove, & Jackson, 1992), and athletes (Gould et al., 1993; Madigan et al., 1992). However, investigations of the relationship between self-reported ST and sport performance have produced equivocal findings.

Rotella, Gansneder, Ojala, and Billing (1980), found that more successful elite skiers did not differ from less successful ones in terms of the ST they used during performance. Highlen and Bennet (1983) reported that elite divers who qualified for the Pan American games were using more content-based self-instruction during competition and less positive ST than nonqualifiers did. Furthermore, researchers who reported nonsignificant relationships between positive ST and performance also found that negative ST was negatively related to performance (Meyers, Cooke, Cullen, & Liles, 1979; Van Raalte, Brewer, Rivera, & Petitpas, 1994).

For over two decades, ST in the form of technical instruction has been applied effectively in clinical and educational settings. ST has been a valuable tool for controlling inappropriate, aggressive behaviors (Meichenbaum & Cameron, 1974), coping with fear (Meichenbaum, 1977), solving math problems (Schonfeld, 1983), as well as improving writing skills (Breiter & Scardamalia, 1987). In the sports setting, according to Schunk (1986), ST aids young athletes and especially those who have difficulties with focusing their attention, recalling information, and coding-interpreting new information related to the task at hand. In addition, ST that is used systematically in order to improve learning may change young athletes' attitudes toward learning by enhancing their self-efficacy, persistence, and mood for accepting new information on the task at hand (Winne, 1985).

Effectiveness for the application of the ST technique has been associated with cues that are clear and precisely related to the task (Landin, 1994). Prior to devising a ST regimen, one needs to consider the type of the skill, whether that is an open or closed one. Closed skills performance may be enhanced when ST is applied prior to the onset of execution. When performing closed skills automatically, ST needs to emphasize what the athlete wants to accomplish rather than the mechanics of skill execution. Bunker and Rotella (1982) suggested that a tennis player
will benefit from thinking about placement rather than serving technique. In addition, closed skills do not require shifts in attentional focus, which simplifies ST application (Nideffer, 1993).

Open skills, in contrast, may benefit from ST since the constantly changing environment conditions mandate attentional focus shifts, and ST may be valuable during execution (Nideffer, 1993). For example, a tennis player preparing to return the opponent’s shot initially uses a broad external focus of attention in order to recognize the stroke used by the opponent and then immediately must shift to narrow external attention focus for responding. To accommodate open skills, ST ought to (a) recognize the initial stimulus and (b) prompt for the right response (Landin, 1994).

Finally, Landin (1994) suggested that an element that also influences ST effectiveness for both skill acquisition and performance enhancement is task complexity. Therefore, prior to assigning appropriate cue-words, one needs to consider whether the task can be segmented in parts for bettering learning and facilitating performance. Complex tasks that require an execution with speed and fluidity often present difficulties when attempting to use ST.

Ziegler (1987) examined ST effectiveness on attentional focus for backhand and forehand strokes (i.e., relatively complex open skills), using 24 novice tennis players. ST words focused on players’ shift of attention to accommodate the ever-changing situations for the two strokes. Cue words were used in the following sequence: “ball,” “bounce,” “hit,” and “ready.” These cue words assisted the athletes in shifting their attention focus from broad external when anticipating the ball, to narrow external for executing the stroke, and back to broad external in preparation for the next ball. The learning process was enhanced for all players in both strokes.

Earlier on, Meyers, Schleser, Cooke, and Cuvillier (1979) investigated the acquisition of gymnastics skills between groups that used various types of ST (i.e., positive, negative, neutral, and coping words). No significant differences were reported for the four ST groups. Contrarily, early descriptive studies provided evidence for the effectiveness of ST on improving performance for endurance tasks and sport-specific tasks from basketball, tennis, and skiing (Hamilton & Fremour, 1985; Rushall, Hall, Roux, Sasseville, & Rushall, 1988; Weinberg, Smith, Jackson, & Gould, 1984; Ziegler, 1987).

More recently conducted studies continued to provide support for the effectiveness of ST. Landin and Macdonald (1990) reported a significant performance improvement for female tennis players who used the ST “set-up” and “hit.” Ming and Martin (1996) found that novice figure skaters, instructed to use audible ST prior to a figure execution, improved their performance in compulsory figures. Mallett and Hanrahan (1997) described the positive effect of ST on producing faster times and consistent performances for 11 of the 12 sprinters that participated in the study. ST was applied as a sport-specific cognitive race plan for the 100m run.

Landin and Hebert (1999) used instructional ST with elite collegiate tennis players. The ST intervention, which focused on movement pattern elements, was introduced to the athletes in a multiple baseline design. A significant improvement was apparent for all players, who reported using the technique at most times, enhanced their confidence and were very effective on focusing their attention on appropriate parts of execution. Theodorakis, Weinberg, Natsis, Douma, and Kazakas
(2000) also reported that instructional ST yielded better performance results when used on tasks involving fine motor skills, whereas it was less effective on tasks that required strength and stamina.

In summarizing the ST literature, which seems to be growing in the recent years, extensive support is given for the effectiveness of ST as a cognitive strategy for improving skill acquisition and enhancing athletic performance in various levels (from novice to elite). Nevertheless, Hardy, Jones, and Gould (1996) discussed that given the important role of ST in athletic performance, the amount of systematic research in this area is rather disappointing. According to Ming and Martin (1996), it is important that ST is simplified to include only a few key words and that participants be asked whether they actually use ST when practicing. Consequently, simplicity in ST and the need for more research exploring ST effectiveness on both skill acquisition and performance enhancement guided the design of this project. The main purpose of this research was to explore effectiveness of instructional ST for learning fundamental basketball skills. It was hypothesized that practice settings using instructional ST would promote greater learning than practice devoid of ST.

Method

Participants

Novice, male children who participate in organized basketball practices were selected for this study. Basketball was the targeted sport as it is the second most popular sport in Greece, and children were selected as a purposeful sample because a plethora of basketball clubs, camps, and academies work with developmental ages. Sixty-two novice boys (M age = 12.2 years) from a local basketball academy volunteered to participate. Novice was defined as “first-time participant in organized practices.” The participants started participating in organized practices in September and the study was initiated in October. Informed consent forms were obtained from the basketball academy director as well as from the participants’ parents.

Experimental Manipulation

This research project was designed to study the influence of an instruction ST intervention on acquisition of three fundamental basketball skills—dribbling, passing, and shooting. The intervention was applied over a 12-week period, during 16 practice sessions. Participants were randomly assigned to two groups (one experimental group and one control group). Due to the large size of groups (31 participants in each), they were further separated into smaller groups (i.e., two experimental subgroups with 15 and 16 participants each and two control subgroups with 15 and 16 participants each). This separation into smaller groups was performed solely for making practice sessions more effective (by working with a smaller number of athletes). For the purpose of presenting this study, the subgroups are treated collectively, as one experimental (n = 31) and one control group (n = 31), since the experimental and control subgroups did not differ in any of the measures.

The ST intervention was embedded into practice sessions, which were led by two regular academy coaches, one for the experimental and one for the control
group. Two coaches participated in the study to assure that experimental and control group practices would be different and the experiment procedures would not be influenced. The two coaches were assistant coaches under the academy head coach’s (lead author’s) supervision. Prior to the onset of the study, the researchers met extensively with the two coaches in order to educate them on the experimental procedures and the assessment tests that would be used. During two separate meetings, the head coach introduced the two coaches to the two different practice modes, the ST practice (experimental group) and the traditional practice (control group), and to a similar coaching style. The experimental group coach was asked not to discuss with his colleagues the ST intervention used in his practices. Following the training sessions, two pilot trials were conducted: one, to ensure coaches’ understanding of the practice modes and a second one for the assessment procedures.

**Practice Modes**

For 30 minutes during every practice session, experimental and control group participants performed three specific drills for each skill. Each drill lasted two minutes, followed by a one-minute rest period. During rest periods, all participants prepared for the next drill. The lead author was present in all practices to assure that the experimental and control procedures were followed precisely and that the coaches employed similar and consistent coaching styles.

The researchers selected the most appropriate drills after reviewing the existing basketball training literature (Mikes, 1987; Wissel, 1994). For example, one of the dribbling drills had the participants weaving in and around five cones arranged throughout the court. For one of the passing drills, each participant passed his ball to the wall for 30 seconds, from a 4m distance. In one of the shooting drills, the participants were organized into partners, where one executed ten consecutive shots from any position on 4m perimeter (i.e., radius), while his partner retrieved the ball after each shot. The order of the drills during practice was counterbalanced. For the remaining of practice time (i.e., 15 – 20 minutes), the participants were allowed to play basketball or age-appropriate variations of the basketball game, using either half or full court.

**Experimental Group.** At the onset of the experiment, participants were introduced to the new mode of practice and the ST that would facilitate skill learning. The content of the ST was determined by surveying 25 experienced basketball coaches. The drill-specific ST utilized in this study were “low, rhythm” for dribbling; “fingers, target” for passing; and “hand, center” for shooting. The dribbling ST was targeted at focusing attention on changing direction while maintaining a relatively low position and sustaining a rhythm when dribbling the ball. The passing ST was aimed at helping the athletes hold the ball efficiently and focusing their attention on the shooting target. The selection of these cues was based on Wissel’s (1994) rating of important elements for technique improvement on dribbling and passing. Lastly, the ST used with shooting was selected in order to direct the players’ attention to a smooth hand movement and to the center of the basket, as Mikes (1987) suggested.

Prior to each drill, participants were reminded of the ST and how it related to the drill. In addition, the participants were reminded to make the ST audible. Finally, experimental group participants were advised not to discuss the ST used in practice with their control group counterparts. The integrity of the experimental
conditions was maintained by scheduling separate practice sessions for the two groups and the presence of the lead researcher at practices.

**Control Group.** These participants performed the same fundamental drills for the same length of time as did the experimental group participants, however their practice sessions did not include ST. Their practice sessions only differed on the event that they executed without using any drill-specific self-statements.

**Tasks and Procedures**

Three skill tests were used to assess participants' levels of dribbling, passing, and shooting:

**Dribbling Test.** The dribbling test used was from the Harrison Basketball Battery (Barrow & McGee, 1979). The test assesses dribbling dexterity and speed. It involves weaving in and around the cones continuously for 30 seconds. Each cone successfully passed earns one point. According to Harrison's work, the test-retest reliability coefficient was .95 (Barrow & McGee, 1979).

**Passing Test.** Stubbs' Ball Handling Test was selected (Barrow & McGee, 1979). Three circles 30 cm in diameter and 1.6m apart are drawn on a flat wall. The first circle is 1.51m above the floor, the second 1.21m, and the third circle is 1.36m above the floor. The athlete is asked to stand behind a line located at 4 meters and 50 centimeters away from the wall. On the verbal signal "Ready, Go," the athlete passes the ball to the first circle, retrieves the ball and passes to the second circle, retrieves the ball and passes to the third circle, then retrieves the ball and passes to the second circle again, then to the first, second, third, etc. The athlete continues passing the ball to the three circles for 30 seconds consecutively. Each bounce either inside the circle or on its perimeter earns one point. According to Stubbs' work, a validity coefficient of .738 was achieved when the ratings were correlated with the best of two trials on the test (Barrow & McGee, 1979).

**Shooting Test.** A three-minute basketball shooting task was used as the performance measure, which was similar to the one used by Weinberg, Fowler, Jackson, Bagnall, and Bruya (1991). More specifically, the athlete is asked to perform as many shots as possible from any position on a perimeter of 3 meters and 66 centimeters (i.e., radius) for 90 seconds. The athlete is responsible for shooting and retrieving the ball. Each successful shot earns one point. Test-retest reliability has been reported at .91 (Weinberg, et al., 1991).

Four assessment sessions were conducted. More specifically, assessments were conducted during practice sessions 4, 8, 12, and 16. Two weeks upon cessation of the intervention program, a retention test was conducted. Hence, a total of six skill assessment sessions were completed, including pre and retention tests. Participants’ test scores were recorded in personal scorecards. Prior to each skill test, coaches reminded the participants of the ST used in practice and how it related to the skill.

**Questionnaires**

Upon completion of assessment sessions 3, 4, 5, and retention, athletes rested for three minutes and then completed a questionnaire, which examined procedure reliability for the present study (Billingsley, White, & Munson, 1980). More specifically, experimental group participants’ questionnaire examined the subjective rate
of use and perceived effectiveness of the ST statements in sum, with the following questions: (a) "How often did you repeat the ST statements during execution?" (b) "Do you believe that this procedure helped you perform?" (c) "Do you believe that it helped you to . . . concentrate better, feel more confident, feel stronger, feel more relaxed, or execute with better technique?" Participants responded on each statement using a 10-point scale ranging from very much to nothing at all. The control group post-experimental questionnaire was different. Control group participants were asked, "Did you think about anything when you were dribbling, passing, or shooting?" In addition, the experimental group coach, after each assessment session, answered a question for each of the athletes, asking him to subjectively rate the frequency of ST use for each athlete on a 10-point scale ranging from very often to not at all.

Results

For the present study, practice mode was the independent variable with two levels: ST practice and traditional practice. The dependent variable was athletes' performance on the three skill tests (dribbling, passing, and shooting), which were assessed six times during the study. More specifically, performance scores for the dribbling test corresponded with the points awarded from dribbling between cones for 30 seconds. Passing performance scores agreed with the total number of times that the ball bounced inside the circles or on its perimeter during a 30-second period of time. Finally, shooting performance was determined with number of successful shots made from the 3.66m perimeter, when shooting for 90 second consecutively. Table 1 presents means and standard deviations for all performance scores. To examine any differences between experimental and control group participants in the pretest scores, ANOVAs were calculated. The results showed that there were no significant differences between experimental- and control-group participants for dribbling, $F(1, 60) = .680, p > .05$; passing, $F(1, 60) = .047, p > .05$; and shooting, $F(1, 60) = .35, p > .05$ prior to the onset of experimental manipulation.

Three $2 \times 6$ (Groups $\times$ Skill Scores) repeated measures MANOVAs, with repeated measures on the performance scores factor conducted. Mauchly’s Test of Sphericity revealed significant scores for all three performance measures: dribbling, $W = .162, p < .001$; passing, $W = .274, p < .001$; and shooting, $W = .305, p < .001$. Hence, in order to avoid Type I errors, analyses interpretations were based on the multivariate tests of significance. According to Maxwell and Delany (1990), the multivariate approach can be used when participants' $N$ is greater than $a + 10$, where “a” represents the number of levels entered in the repeated measures. This condition was satisfied as group $n$ was 31, which was greater than $a + 10 = 6 + 10$.

Dribbling Performance

The multivariate Hotteling’s Trace test revealed a significant interaction between dribbling scores and groups, $F(5, 56) = 10.256, p < .001, \eta = .478$. More specifically, there was a significant difference, $F(1, 60) = 12.210, p < .001$, on dribbling scores between participants who were taught the dribbling skill with different practice modes (ST and traditional practice). To examine which assessment differences existed between the two groups (ST and traditional) in dribbling scores, t tests for
Table 1 Means and Standard Deviations for All Performance Scores Across Assessment Sessions

<table>
<thead>
<tr>
<th>Basketball skills</th>
<th>Performance Assessment</th>
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<tr>
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<td>1st</td>
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<td></td>
<td>(Pre)</td>
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<tr>
<td><strong>Dribbling</strong></td>
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<tr>
<td>Self-talk</td>
<td>19.90</td>
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<td></td>
<td>(+2.62)</td>
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<tr>
<td>Control</td>
<td>19.39</td>
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<td></td>
<td>(+2.29)</td>
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<tr>
<td><strong>Passing</strong></td>
<td></td>
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<tr>
<td>Self-talk</td>
<td>09.90</td>
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<tr>
<td></td>
<td>(+1.64)</td>
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<tr>
<td>Control</td>
<td>10.00</td>
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<tr>
<td></td>
<td>(+1.86)</td>
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<tr>
<td><strong>Shooting</strong></td>
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<tr>
<td>Self-talk</td>
<td>03.90</td>
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<tr>
<td></td>
<td>(+1.96)</td>
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<tr>
<td>Control</td>
<td>03.81</td>
</tr>
<tr>
<td></td>
<td>(+2.10)</td>
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Asterisks indicate significant difference between the two groups. *p < .05, **p < .01.

Independent groups were calculated using Bonferroni adjustment with the initial level of significance set at .05.

After the Bonferroni adjustment, in the second assessment session, significant performance differences existed between the groups (t = 2.789, p = .007). More specifically, the dribbling mean score for the experimental group was higher than that of the control group. During the third assessment, the experimental group mean scores were significantly higher than those of the control group (t = 2.681, p = .009). Experimental group participants outperformed their control group counterparts as shown by the dribbling mean scores in the fourth (t = 5.586, p = .000) and fifth assessment session (t = 5.241, p = .000), respectively. Finally, in the retention test, the experimental group participants dribbled significantly better than their control group counterparts (t = 4.956, p = .000). Figure 1 shows dribbling mean scores for both groups across the six assessment sessions.

**Passing Performance**

The multivariate Hotteling’s Trace test revealed a significant interaction between passing scores and groups: F(5, 56) = 4.994, p < .001, η = .308. A significant difference, F(1, 60) = 4.680, p < .05, was computed for passing scores between participants who were taught the skill with different practice modes (ST and traditional practice). To examine which assessment differences existed between the
two groups (ST and traditional) in passing scores, t tests for independent groups were calculated using Bonferonni adjustment with the initial level of significance set at .05.

After the Bonferonni adjustment, in the second assessment session, no significant performance differences existed between experimental and control group participants ($t = .688, p = .494$). During the third assessment, experimental group mean scores were not significantly different than those of the control group ($t = .786, p = .435$). Differences did not exist in the fourth assessment, according to the Bonferonni adjustment ($t = 2.176, p = .033$). Significant differences emerged for fifth and retention assessment sessions. Experimental group participants performed better than their control group counterparts did as shown by the passing mean scores in the fifth assessment session ($t = 3.550, p = .001$). Finally, in the retention test experimental group, participants again performed significantly better than their control group counterparts ($t = 3.842, p = .000$). Figure 2 shows passing mean scores for both groups across the six assessment sessions.

**Shooting Performance**

Multivariate Hotteling’s Trace test revealed a nonsignificant interaction between passing scores and groups: $F(5, 56) = .754, p > .05, \eta = .063$. In addition, there was no significant difference, $F(1, 60) = 1.087, p > .05$, on shooting test mean scores between groups. However, significant differences were computed for participants’ shooting mean scores, $F(5, 56) = 5.938, p < .001$, between the six assessment sessions (see Figure 3).
Figure 2 — Performance scores for both groups across assessments for the passing skill.

Figure 3 — Performance scores for both groups across assessments for the shooting skill.
Questionnaires

Participants’ answers to the questionnaires were analyzed with repeated measures ANOVAs. For the question, “How often did you repeat the ST statements during execution?” the analyses showed significant differences between assessment sessions: $F(3, 90) = 5.238, p < .001$. Further analyses with paired $t$ tests revealed significant differences between the ST use scores between the third and fourth assessment ($t = -3.437, p < .05$), the third and fifth ($t = -2.278, p < .05$), as well as the third and retention test assessment ($t = -3.636, p < .05$). For the question, “Do you believe that this procedure helped you perform?” the results showed no significant differences between assessment sessions: $F(3, 90) = .304, p > .05$. Finally, for the third question, “Do you believe that it helped you to (a) concentrate better, (b) feel more confident, (c) feel stronger, (d) feel more relaxed, or (e) execute with better technique,” an ANOVA examined differences among participants’ responses. According to the results, differences existed between the participants’ responses: $F(4, 120) = 12.513, p < .05$. Descriptive statistics showed that ST aided participants’ performance by enhancing (a) their technique ($M = 8.70, SD = 1.24$), (b) concentration ($M = 8.08, SD = 1.53$), (c) confidence ($M = 7.58, SD = 1.47$), (d) feeling of strength ($M = 7.36, SD = 2.20$), and (e) feeling more relaxed ($M = 6.41, SD = 2.28$).

For the control group questionnaires, descriptive statistics were initially computed, then participants’ responses, which registered thoughts during execution, were transcribed and percentages were calculated. In the third assessment, 48.4% of the control group participants responded having thoughts during execution, and 51.6% did not think about anything. In the fourth assessment, 22.6% had thoughts, and 77.4% did not think about anything. In the fifth assessment, 35.5% had thoughts, while 64.5% did not have any thoughts. In the retention test, 25.8% had thoughts, and 74.2% did not think about anything. According to the frequency distribution, throughout all assessments, most participants reported thinking about improving themselves (10.48%), achieving a high score (8.87%), and concentrating (4.84%). The remaining 75.81% of responses were spread among thoughts about stress, technique, remaining relaxed, failing, friends, family, and schoolwork.

Finally, the experimental group coach reported that ST was more frequently used during assessment sessions for dribbling ($M = 29.81$) and passing ($M = 30.45$), rather for shooting ($M = 26.27$). Independent group $t$-test results revealed no significant differences in mean scores of use between dribbling and shooting ($t = 1.938, p > .05$), however, significant differences were computed for mean scores of use between dribbling and shooting ($t = 7.823, p < .001$) as well as passing and shooting ($t = 9.652, p < .001$).

Discussion

Coaches and physical educators have always been concerned with effectiveness in teaching new motor skills to their athletes and students. In the present study, we investigated the effectiveness of instructional ST on acquiring fundamental basketball skills for young, novice players. According to Schunk (1986), ST may be particularly useful to novice athletes for focusing their attention and encoding task-related information. This study was a leading one in terms of applying the experimental manipulation for a 12-week period during practice sessions with the athletes’
regular coaches and using multiple assessment sessions (pretest, 4 assessments over 12 weeks, and retention test). Most of the published studies that examined ST effectiveness on young, novice athletes had a relatively short intervening period (Landin & Hebert, 1999; Landin & Macdonald, 1990; Theodorakis, et al., 2000; Ziegler, 1987).

When dribbling, athletes were asked to repeat the ST statements "low, rhythm;" when passing the ball, they used "fingers, target;" and when shooting, "hand, center." Findings in the present study revealed that novice players who utilized ST had a significant improvement in two of the three basketball fundamentals on which they were working. They improved in dribbling and passing more than the participants not using ST did. There was no difference between the groups in shooting. This improvement in the performance of dribbling and passing is a meaningful one, both theoretically and practically. Based on the existing theoretical framework, self-talk is effective for enhancing technique (Landin, 1994; Wrisberg, 1993; Zinsser et al., 1998). Improvement in technique may then lead to performance improvement (Landin, 1994; Landin & Hebert, 1999). Furthermore, ST has been reported to influence movement patterns more than actual outcome scores (i.e., performances; Landin & Hebert, 1999; Masser, 1993).

In terms of enhancing performance, instructional ST has proven beneficial in various situations, including this study (Harvey, Van Raalte, & Brewer, in press; Rushall, et al., 1988; Theodorakis, et al., 2000). Evidence in our study came from (a) the participants’ performance improvement during the 12-week ST intervention, as shown from the assessment sessions and (b) the experimental group participants’ significantly improved performance in dribbling and passing two weeks past the experimental manipulation, as determined by the retention test scores. The extended timeline of this research project (ST was applied for 12 weeks) offers an excellent interpretation for this performance improvement. However, for applying these findings, one needs to consider that performances were enhanced with the use of ST, which was always accompanied by physical practices. Thus, ST should be used in conjunction with physical practice. Although the two weeks period of time between experimental manipulation and retention tests was possibly not long enough to examine skill retention, the participants did sustain a higher level of performance in dribbling and passing and in the use of ST during the assessment as the coach reported. This finding strengthens the existing literature about ST being an effective tool for skill acquisition.

Although ST enhanced dribbling and passing performances and skill acquisition, it did not help athletes perform better when shooting. For this finding, three explanations are considered: (a) the complexity of the skill; (b) the lower rate of ST use when shooting, as reported by the participants, as well as the experimental group coach; and (c) the participants’ young age and low level of experience. According to Landers and Butcher's (1998) classification, basketball shooting is a complex skill. The existing sport literature argues that complex motor skills, which may be segmented yet require speed and fluidity to execute, make designing ST difficult (Landin, 1994; Wiese-Bjornstal & Weiss, 1992). This is possibly why ST did not enhance acquisition and performance of the shooting skill. An alternative explanation for the lack of significant improvement in shooting when using ST derived from the athletes' self-reports and the coach's subjective ratings. Athletes and coaches reported that the shooting cues were not used as frequently as those were for dribbling and passing. Hence, the lower use rate may account for the lack
of performance differences between experimental and control group participants. Finally, participants' young age and inexperience in basketball may also explain the poorer performance that participants exhibited in the complex skill of shooting. Nonetheless, although the ST statement used for shooting was selected in order to direct the players' attention to a smooth hand movement and to the center of the basket as Mikes (1987) suggested, it is still possible that it did not link well to the skill.

As Zinsser et al. (1998) stated, an appropriately designed ST regiment can aid in acquiring new skills and improving previously learned ones. The purpose of this study was to examine ST effectiveness on learning fundamental basketball skills through a 12-week ST program. The young, novice players who participated in this study improved in dribbling and passing, and according to the questionnaire analyses, they perceived that the ST used during practices was a valuable tool for them. Being on target with the goal of instructional ST, athletes perceived that ST enhanced their technique more than any other cognitive skill and/or technique (i.e., concentration, confidence, strength, and sense of relaxation). More specifically, the participants reported that ST helped them perform with proper technique and reminded them of what to do. Landin and Hebert (1999) reported similar results based on their questionnaire analysis. Concentration was the second factor for which the athletes perceived that ST helped. Schunk (1986) suggested that ST aids novice players' attentional focus, which is supported by our findings.

Overall, our results can be generalized to similar age, expertise level, and skill complexity situations. In terms of practically applying the findings of this study, ST may be useful to physical educators and coaches who work with overpopulated groups, and they have difficulty providing wordy feedback to all participants. ST has to be simple yet well designed and linked to the skill. ST needs to be used at a frequent rate. The retention test results support the idea that ST is a valuable tool for skill acquisition in novice athletes.

Nonetheless, certain factors may have limited the results of this study. For example, we used two different coaches, one for the experimental and one for the control group, in order not to bias the experiment and control practice modes and to have participants working with their regular academy coaches. Although the lead researcher was present in all practices, it is possible that the coach and not the experimental condition enhanced skill learning. The small amount of time between the intervention and the retention test, as discussed previously, may have also limited our findings. Furthermore, participants were not asked specifically in which skill they used ST the most hence did not provide us with clear information about the use of ST. Lastly, since the 10–15 minutes of remaining practice were used for playing basketball, this may also have played a role in participants' improvement as they received disparate experience with the skills.

In conclusion, complexity of the skill, rate of ST use, and participants' basketball experience appear to be the most prominent explanations for the participants' improvement in dribbling, passing, and shooting. Future studies need to reexamine participants' skill level and clarify the role that age and experience play. Researchers should also look into how ST influences technique and concentration, as participants in our study perceived these factors being the most influenced ones. Furthermore, an applied step may be to implement instructional technical ST in real game or game-like situations and to examine how that influences competitive situations.
References


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