Effects of Implementation Fidelity of Lesson Segments on Learning a Motor Skill

Hasan Al-Tawil, Faculty of Sport Sciences, Mutah University, Al-Karak, Jordan.

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Abstract

This study aims at investigating the effects of the implementation fidelity of lesson segments on learning a motor skill (shot put). The study sample consisted of (2) physical education (PE) teachers, one representing the experimental group and the other the control group. The two (PE) teachers taught sixth grade boys six lessons focusing on the shot put. Both teachers implemented the same lesson segments and provided comparable amounts of practice time. The teacher of the experimental group received inservice training regarding appropriate implementation of each lesson segment, and performance feedback after the first of the six lessons.

Results of the study indicated that both groups demonstrated a statistically significant improvement in shot put distances. The gains in distance were significantly better by those in the experimental group, by an average of 0.69 meters. According to the results, the researcher concluded that teachers can make significant changes in lesson delivery and improvement performance of the shot put skill with inservice training regarding stating lesson objective, motivation, explanation and demonstration of the skill, allocated practice time, specific feedback of the skill, and class management.

Introduction

Successful teaching can be measured in terms of the extent to which a student is learning the intended objectives of the Physical Education (PE) lesson. Because of this, PE teachers must implement the PE lesson under a program theory so that they can improve students' performance level (distance) in the shot put skill or in other different motor skills. Literature shows that features of the implementing organization and its ecological context are related to the strength and fidelity of implementation (Denise, et al 1997). Ensuring that learning takes place in PE has been a challenge to physical educators for many years (Newsome, John A, 2005). The magnitude
of the achievement gains varied by school and fidelity of implementation. (Schacter, John; Thum, Yeow Meng, 2005).

Because teaching behaviors can have a facilitating or inhibiting effect on how much students learn, PE teachers should be aware of those behaviors that contribute to student learning. According to Mohnsen (1997), teachers who pay little attention to current research on teaching and learning often see little improvement in their student performance, while those who use effective teaching behaviors see their students gain motor, cognitive and affective skills.

A significant amount of research has been done to identify behaviors that can be associated with effective teaching. Much of the literature on teacher effectiveness in PE, however, simply generalizes findings from classroom research to the PE setting. Gusthart and Springings (1989) contend that while it is fair to assume that generic variables exist, their application to PE settings without efforts to support their relationship to learning outcomes is unacceptable. Many authors (Dunkin and Biddle, 1974, Silverman and Ennis, 1996) also warn of the risks involved in reporting patterns of teacher behaviors without considering context factors such as grade level, teacher objectives, and subject matter.

Some work has been done relative to effective teaching in PE settings. For example, Yerg (1980) found group instruction of specific information and feedback to a single student on the entire skill were positively related to pupil achievement, while simultaneous practice with the teacher talking and detailed verbal feedback were negatively related to pupil achievement. A summary of research by Rink (1998) on task presentation in PE pedagogy suggested that teachers who effectively presented instructional tasks to students utilized certain teaching behaviors and tasks comprising particular variables. Rink concluded that physical education research supported the use of appropriate teacher cues and full demonstrations of skill. Behets (1997) examined teachers’ and students’ behaviors in a gymnastic setting and found that the most effective teachers scored significantly higher for active learning time and significantly lower for instruction time. No major differences were found for teachers’ location and movement patterns, and for teacher feedback statements. Several significant differences were found for the instructional variables, leading Behets to conclude that effective teaching is characterized by a lot of practice time and limited instruction and management.

The purpose of this study was to investigate the effects of the systematic implementation of designated lesson segments on students’ learning of a motor skill. While there is a Jordanian physical education curriculum, the degree to which students learn depends upon how teachers choose to instruct. Curriculum materials can provide teachers with instructions regarding what lesson components to implement in what order, the impetus is still on the teacher as to how those components are implemented, and the impact those
decisions have on learning. The intent of this study was to assess the effect that a rigorous implementation of lesson segments had on the learning of a motor skill.

**Importance of the study**

Based on the picture of the typical physical education class presented by the observational research evidence, many PE educators set out to determine the behaviors of good teachers, define precisely what those behaviors are, and teach them to novices. Believing that higher frequencies of certain teacher behaviors would result in greater student learning, researchers trained teachers to change the type and quality of information delivered to students (Silverman & Ennis, 1996).

Task presentation skills including determining objective of the lesson, explaining motivation of learning the skill, introducing effective explanation/demonstration and sample of the skill, allocated practice time, providing students with specific feedback of the skill, and art of class management, are important segments for an effective PE lesson in terms of students' learning. Also, these instructional variables may be of value in providing a complete description of the teaching/learning process in PE.

Searching for a new strategy to implement a PE lesson to improve students' performance skills is considered to be an important process. Improving students' levels either in performance or distance in the shot putt skill will not occur through the theoretical solutions. An experimental process is highly recommended through applying a new strategy for implementing a physical education lesson to see to which degree it would improve students' level. Having an objective, real data, and information in this term especially when it is positive can be generalized to PE teachers and students. So this study is a trial to investigate the effects of the systematic implementation fidelity of designated lesson segments on students' learning a motor skill (distance) a shot putt skill.

**Problem of the study**

The implementation of PE lessons has been going through a lot of problems such as time erosion, students learning the lesson objective, and other different problems. This created an important question which should be answered by PE teachers “How Should I Teach PE Lessons to Make my Students Learn?”.

As indicated, such problems are enough to frustrate PE teachers and not get them willing to search for a new and effective strategy to implement a PE lesson in a manner their students can learn. The researcher introduced the study problem based on his observations recorded when he was a PE teacher in Jordanian public schools, and now as a PE teacher educator at the
university, teaching practicum courses, following up, and supervising student teachers at schools.

All PE teachers in Jordanian public schools are required to teach the same PE curriculum which is assumed to be designed to achieve goals and objectives determined by expertise in the field of PE. The shot putt skill used in this study is one of that curriculum skills. It was selected because it is considered to be one of the important skills in the elementary school PE curriculum, and it is being a focus of interest in the PE field.

The interrelationship of the behaviors of trained teachers could be considered as an important subject of investigation. This research on teaching behaviors was conducted to identify if the implementation fidelity of such behaviors will improve students’ level (distance) in the shot putt skill.

**Literature review**

Some of the research has been done on the field of teaching physical education and students learning with concentration on different subject matters. A summary of the research results is as follows:

1. Classrooms with maximum training scored on the average approximately 10 per cent higher than the classes without training.
2. Learning did occur better in the experimental group in motor skills.
3. Group instruction of specific information and feedback to a single student on the entire motion were positively related to pupil achievement, while simultaneous practice with the teacher talking and detailed verbal feedback were negatively related to pupil achievement.
4. A significant relationship exists between a teacher’s certain behaviors and a student’s achievement.
5. Planning has a positive effect on preservice teachers’ teaching behaviors, Learners taught in planned lessons spent less time in noninstructional aspects of an activity, less time waiting their turn, and less time being off-task during an activity time.
6. More effective teachers spent more lesson time in the functional behaviors of concurrent instruction and intervening instruction,
7. Planning positively affected some teachers’ instructional behaviors. Planning was important to the employment of effective teaching behaviors in the interactive teaching environment.

**Some of the related research as follows:**

Warren, et al (N/A) investigated the consequences of different levels of training on implementation of the Demonstration and Research Center for Early Education program. Classrooms with maximum training scored on the
average approximately 10 per cent higher on each of the essentials than the classes without training.

Gusthart and Springings (1989) conducted a study to examine the effects of two experienced and expert teachers on the degree of students learning in six lessons that dealt with teaching force production and reduction skills related to jumping and landing. Results of the study stated that for three of the four force production and reduction skills, learning did occur in the experimental group.

Also, Yerrg (1980) conducted a study to identify teaching-learning process behaviors that affect students’ achievement on a psychomotor task. Forty preservice physical education teachers were each taught a twenty-minute cartwheel lesson to three elementary school pupils. Factor analysis of the raw data led to the formation of four teacher behavior factors. Group instruction of specific information and feedback to a single student on the entire motion were positively related to pupil achievement, while simultaneous practice with the teacher talking and detailed verbal feedback were negatively related to pupil achievement.

Creemers (N/A) studied the relationship between task setting teaching behavior and pupil achievement. Task setting behavior is the actions of the teacher to achieve the goals of teaching a specific content. The results of the investigation show that a significant relationship exists between a teacher’s certain behaviors and student achievement.

Byra and Stephen (1992) conducted a study that aimed at comparing and contrasting the effects of planning on the instructional behaviors of a group of preservice teachers across two teaching conditions, a plan condition and a no-plan condition. Results of the study suggested that planning has a positive effect on some preservice teachers' teaching behaviors. Learners taught in planned lessons spent less time in noninstructional aspects of activity, less time waiting their turn, and less time being off-task during activity time. Teachers were more attentive to the actions of learners during pre-task presentations, and provided specific corrective feedback that was congruent to the skill focus of the lesson more frequently during post-task presentations. For teachers-in-training it seems that planning is important to the employment of effective teaching behaviors in the interactive teaching environment.

Hastie (1994) stated that when he collected data from teachers during secondary school volleyball quantified teacher behaviors related to high student involvement levels and examined student accountability. More effective teachers spent more lesson time in the functional behaviors of concurrent instruction and intervening instruction, and less effective teachers spent more time in noninteractive behaviors such as observing.
Byra and Coulon (1994) reported that planning positively affected some teachers' instructional behaviors. Planning was important to the employment of effective teaching behaviors in the interactive teaching environment.

**Purpose of the Study**

The purpose of this study was to investigate the effect of the implementation fidelity of lesson segments on students learning a motor skill. More specifically, the study was designed to detect the effects of teaching designated lesson segments on the degree of sixth class students’ learning a shot putt skill.

**Methods**

Two physical education teachers in public schools of Al-Karak city of the academic year 2004/2005 were asked to participate in this study as volunteers. They were randomly assigned to the experimental and control group. Each teacher agreed to teach his sixth grade class consisting of (51 males) at his school. Both teachers had a Bachelor of Arts degree in physical education, and at least five years of teaching experience. A shot putt skill was chosen from the Jordanian physical education curriculum. The teachers taught two lessons per week for three weeks that focused primarily on putting a shot weighing two kilograms.

Both groups received their regular physical education lesson that consisted of a warm up, calisthenics, explanation of the skill, application of the skill, and a cool down. Each teacher provided their students with comparable amounts of practice time on the skill in question throughout the six lessons. The teacher with the experimental group received a three-hour inservice regarding the appropriate implementation of the following lesson components: clearly stating the lesson objective, providing motivation for learning, proper explanation and demonstration of the skill in question, allocating sufficient practice, providing feedback, and managing the class. The experimental teacher was provided with a clear set of criteria that needed to be met in each lesson component for it to be considered as administered appropriately (see appendix 1).

The teacher was prepared for the first lesson, observed while he taught it, and debriefed regarding his implementation. His subsequent five lessons were videotaped and analyzed regarding his implementation fidelity.

The researcher used an observational tool that included the criteria for each of the six lesson components that had to be met to score the experimental teacher's performance. Pretest and posttest scores consisted of taking the best distance of three putt attempts. Student testing occurred independent of the two teachers that participated in the study. Both groups of students were tested under the same conditions and by the same testers.
Results

The analysis of the experimental teacher's implementation fidelity appears in Table (1). The teacher met enough criteria in all the six components of the lesson to have each of them deemed as implemented appropriately. The analysis of the videotaped lessons also indicated that the teacher's instruction met enough criteria to deem all the six components where implemented appropriately across all six lessons.

Table (1): Implementation fidelity for the experimental teacher on lesson components

<table>
<thead>
<tr>
<th>Teaching behavior</th>
<th>Observation trial</th>
<th>Videotaping trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stated the lesson objective</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Motivated</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Explained and demonstrated the skill</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Allocated practice</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Provided feedback</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Class management</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Descriptive statistics on pre- and post-test data appear in Table (2). The scores for both the experimental and control groups demonstrated a statistically significant improvement. In terms of gains, the experimental group was superior, with an average gain of 0.68 meters for the control group and an average gain of 1.37 for the experimental group.

Table (2): Difference across groups on average shot putt distances (meters) on the pretest

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Pretest</th>
<th>Posttest</th>
<th>t value</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (n=51)</td>
<td>Mean= 5.62</td>
<td>Mean = 6.99</td>
<td>9.38</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>S.D.= 1.08</td>
<td>S.D.= 1.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (n=51)</td>
<td>Mean = 5.21</td>
<td>Mean = 5.89</td>
<td>8.15</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>S.D.= 1.03</td>
<td>S.D.= 1.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t value</td>
<td>1.98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sign.</td>
<td>0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A comparison of the pre-test data across groups suggests there was a significant difference between groups in pretest shot putt performance at p<0.05. Results from an analysis of covariance appear in Table 3.

Table (3): ANCOVA for the effects of specified teaching behaviors on the post-test of student's performance of the two groups

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE Covariates</td>
<td>1</td>
<td>125.366</td>
<td>125.366 172.358 .000</td>
<td></td>
</tr>
<tr>
<td>GROUP</td>
<td>1</td>
<td>10.916</td>
<td>10.916 15.008 .000</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>99</td>
<td>.727</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td>228.605</td>
<td>2.263</td>
<td></td>
</tr>
</tbody>
</table>
While both the experimental and control groups exhibited a significant improvement in performance, results from the ANCOVA show that the scores from the experimental group were superior to those from the control group after controlling pretest differences. This result is consistent with the results of the Gusthart and Springing's study that showed greater learning did occur in the experimental group.

Discussion

Findings from this study indicate that teachers can apply lesson components with a high level of implementation fidelity given certain conditions. In this case, the instructor implemented all lesson components of all lessons appropriately over a three-week period. The teacher's preparation for the task included three primary components. First, the experimental teacher was provided with three hours of professional development prior to his instruction. While most of the content was generic in nature (i.e., what are the criteria that constitute an effective lesson segment, and what counts as adequate implementation of those criteria?), some examples were specific to the content of the study (i.e., shot put). Second, the instructor received performance feedback during the early stages of instruction. Theoretically, this provides the instructor with important information regarding what they are doing correctly and extinguishes incorrect performance early in the learning process. Third, the videotaping of lessons provided a degree of accountability and expectation regarding the teacher's performance. While it is impractical to videotape and review all teachers all the time, it is not unreasonable to prepare and use mechanisms that assess the degree to which teachers are implementing components of instruction that contribute to improved student performance.

This study found that while the two teachers implemented the same basic lesson components over the same number of lessons, the quality of their implementation differed. Both teachers implemented instruction that consisted of a warm up, calisthenics, explanation of the skill, application of the skill, and a cool down. Each teacher also provided their students with comparable amounts of practice time on the skill in question throughout the six lessons. The content of the lesson segments differed in that the experimental group always stated the day's learning objective in clear terms, provided an appropriate advanced organizer that included a rationale for learning the day's content, and a daily review of the day's lesson. Time spent on direct instruction was limited to the experimental teacher, and classroom management techniques were directed more towards getting students to refocus on the learning task rather than correcting their behavior.

The differences between instruction corresponded to significant differences in performance between the two classes. The average gain in shot put distances were statistically significant. After six days of instruction, the
average putt for the control group increased by 0.68 meters, while the experimental group demonstrated an average gain of 1.37 meters.

Clearly, the actions taken by teachers during instruction can either facilitate or inhibit rates of learning. While some research on effective practices in teaching physical education has been completed, much of what we assume to be effective practices are generalized from classroom research. Researchers must also take into account such factors as grade level, teacher objectives, and subject matter when assessing instructional effectiveness.

This study attempted to assess the impact the application of general principles of instruction had on the shot putt performance of six grade boys in Jordan. Results from the study indicate that teaching behaviors can be positively affected by the combination of inservice training, performance feedback during the early stages of implementation, and an assessment mechanism that helps hold the instructor accountable for implementation fidelity over time.

The study also indicates that appropriate implementation of general principles of effective instruction can have a positive effect on motor skill performance.

Based on the results of the study, the researcher suggests that a further study with more stringent controls over intervening variables and across other contextual factors such as grade and subject matter be carried out.
أثر التنفيذ الأمين والدقيق لأجزاء في درس التربية الرياضية على تعلم مهارة حركية

حسن الطويل، كلية علوم الرياضة، جامعة مؤتة، الكرك، الأردن.

ملخص

هدف هذه الدراسة إلى البحث في أثر التنفيذ الأمين والدقيق لأجزاء في درس التربية الرياضية على تعلم المهارة حركية (رفع الجلة). تكمن عبئية الدراسة من دروس تربية الرياضية في أن كلاً من المدرسين يتدربان طلابه (الصف السادس الأساسي / ذكور) سنة دروس تربية الرياضية (مهارة رفع الجلة). حيث كان كل منهما يتدرب على نفس أجزاء المدرس بالرقم، في سلسلة منهما طلابه نفس الوقت لمراقبة المهارة. تلقى المدرس الذي يمثل المجموعة التجريبية تدريب مسبق من قبل الباحث شخصياً قبل تدريب المدرس الثاني وذلك فيما يتعلق بالمهارة الأمين والأدبي لكل جزء من أجزاء المدرس المحدد. وبعد تدريب المدرس الأول، وتحت إشراف ومرافقة الباحث شخصياً فقد تم تزويده بتغذية راجعة تتعلق بكيفية تدريسه، أما المدرس الآخر لم يتلق أي تدريب مسبق قبل تدريسه أي من المدرس السابق. أشار النتائج إلى أن طلبة المجموعتين حققوا تقدم ذو دلالات معتبرة في سطح فعالية الجملة. إلا أن التقدم كان أفضل بالنسبة لطائفة المجموعة التجريبية بمقابل باي (69.0 سم). وبناءً على نتائج الدراسة فإن الباحث استنتج أنه كان هناك تقدم أفضل في دفعة الجملة لطائفة المجموعة التجريبية الذين تلقوا تدريب المسبق. كما أن المدرس التربية الرياضية يمكن أن يعمل تغذية راجعة في عملية تدريس درس التربية الرياضية وذلك يظهر في مهارة كشوف الجمة في حالة فعالية تدريس مسبق وتعاأت تدريبية (التنفيذ الدقيق وأدبي) لأجزاء المدرس في الدروس، الدالة، التدريس، الشرح الممارسة، الإعداد، مواجهة للمهارة، تخصص وقت محدد، وكلاً لمراقبة المهارة، التدريب المحدد للمهارة، ثم الفن في إدارة الصف، والتي تسهم في تقدم مستوى الأداء في مهارة رفع الجلة.
References


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**Appendix (1): Criteria That Needed To Be Met In Each Lesson**

It was explained to the experimental teacher that he should meet the following criteria in each of the six lessons:

1. **State lesson objective clearly:**
   Inform students with the lesson objective as following:
   Students should stand up close to each other (clustered) so that all of them can see and hear the teacher, the teacher should stand up in a place that allows him see and hear all students, using a simple and understandable language, making sure that all students know the lesson objective through asking some of them randomly about the lesson objective.

2. **Motivation:**
   Inform students of the importance of the shot put skill and the benefits they would obtain when they perform the skill correctly such as they will develop and improve their muscles, they will be good shooters of the skill, they might be the best shooters in the school, might be in the directory of education, might be in the ministry of education, and then might be in the whole kingdom. Then they will represent the kingdom in the world competitions, and they will receive a lot of encouragement and incentives from the responsible people.

3. **Explanation and sample of the skill:**
   The teacher will ask students to stand up in a form that allows all of them to see and hear the teacher such as a circle or any other form, then the teacher will explain correctly the learning steps of the skill one by one and the technicalities for each learning step using a simple language. Then he
would ask some of the students randomly chosen about the steps to make sure that they did understand all of them. After that the teacher will perform a practical example of the skill in front of the students once or twice, then he would ask one or two students to perform the skill in front of the others.

4. Allocating enough time for practicing the skill:
   The teacher will allocate sufficient time for students to practice the skill (20 minutes) for example, distributing students to practice the skill as much as possible based on the equipments and facilities. For example, each student or every two together practices the skill alone.

5. Providing students with feedback:
   During the practice time, the teacher will walk around and among students to see to which degree they are performing the skill correctly; when the teacher observes a student practicing the skill correctly, he will encourage him by saying you are doing excellent or good depending on his/her practice. On the other hand, when the teacher sees the student practicing the skill incorrectly, he will stop him and explain to him the correct way for practicing the skill and then he will ask him to complete. But when the teacher observes most of the students practicing incorrectly, he will stop all the students and he will re-explain steps of learning the skill then he will ask them to go back to practice.

6. Class management:
   The teacher must do the following:
   - prepare all equipment into the field before the class starts.
   - use an effective strategy for distributing the equipment to students for the purpose of having students practice the skill as long as possible.
   - use an effective strategy for the purpose of decreasing the off behaviors.
   - have an expectation of how many students can make an off behavior during the lesson.
   - have a punch of punishments for students who might have an off behavior.
   - have some of the students work as leaders during the class.
   - use enough equipment to implement the lesson parts correctly.
   - follow up all students during all the lesson time.
   - get all students involved in the lesson activities.
   - have all students practice the skill equally.