Moving and Learning in Physical Education:

An Interdisciplinary Approach

Analysis of a Videotaped Lesson from an Exercise Physiology Perspective

GREG BIREN PETER RATTIGAN

Physical educators can infuse fitness concepts, teach exercise science, and increase activity in their lessons all at the same time.

Public school physical education in the United States can be considered to be at a critical point in its history. On the one hand, critics have charged, with some justification, that students should be developing reasonable fitness levels and mastering certain fundamental movement skills to a greater extent than appears evident in many schools (Pate & Hohn, 1994). On the other hand, physical education practitioners and programs stand at the forefront in the fight against obesity, in the effort to increase children's physical activity, and in helping children become physically educated, healthy, and active adults (AAHPERD, 2005; National Association for Sport and Physical Education [NASPE], 2004b). The master physical education teacher is one who is able to teach and motivate students to develop health- and skill-related fitness as well as fundamental (and, to a reasonable extent, refined) motor skills.

In the authors' analysis of the videotape of a teacher candidate instructing middle school students in pass patterns during a football lesson, the larger issues mentioned above form the bases for many of the observations. These observations relate to the emphases that the Exercise Physiology Academy believes should exist in a model physical education program. The lesson is reviewed in terms of its value in developing health- and skill-related fitness, and in relation to the national standards for physical education (NASPE, 2004a). Standards three and four require students to participate regularly in physical activity and to develop and maintain health-related fitness levels. Other organizations reflect these expectations, for example, that students regularly participate in moderate-to-vigorous physical activity and that students be physically active for at least 50 percent of physical activity class time (U.S. Department of Health and Human Services, 2000).

There is more to health- and skill-related fitness than physical activity itself, however. More subtly, standard two provides the expectation of learning physiological as well as other scientific principles underlying physical activity. For example, this is a sample outcome given for grades six to eight: "Describes basic principles of training and how they improve fitness" (NASPE, 2004a, p. 24). Teaching students the physiology of exercise and physical activity, the authors believe, motivates them to become interested in their body and to develop and maintain their body's potential, and improves the likelihood

For every two active students (the passer and receiver), several students inactively awaited their turn.

they will become active, physically educated adults (Biren & Rattigan, 2005). The idea of teaching the science of exercise and physical activity is reflected in the national standards for beginning physical education teachers (NASPE, 2003). Standard one is concerned with content knowledge. Standard 1.4 states, "[Teachers] Describe and apply bioscience (anatomical, physiological, biomechanical) and psychological concepts to skillful movement, physical activity, and fitness" (NASPE, 2003, p. 8). Guidelines for exercise physiology preparation for physical education teacher education programs have been developed for such a purpose (Biren & Rattigan, 2005; NASPE, 2006). It is important for physical education teachers, beginners and beyond, to learn, apply, and teach scientific principles to students, while at the same time keeping them active and purposefully engaged in both fitness and skill development.

Video Analysis

The lesson consisted of the teacher demonstrating a basic pass pattern and the role of the passer and receiver. The teacher assigned students to stations, each of which had a card that explained the pass pattern for that station.

The level of activity in the lesson was low, with students not moving for approximately 70 to 85 percent of the time. Students should be active at least 50 percent of lesson time, as noted above (U.S. Department of Health & Human Services, 2000). Regarding instruction in health- and skill-related fitness, no such components are addressed or evident in the lesson. It is possible that this had been addressed before the lesson episode in the video, or in parts of the lesson not evident in the video segment. However, the latter, especially, seems unlikely. The evidence in the video begs the question: is fitness a part of every lesson, that is, is health- and skill-related fitness infused into the whole program?

The subject matter itself begs the question of the appropriateness of the content for promotion of lifelong fitness. To some, football may seem an inappropriate focus for developing lifetime fitness habits. However, with an emphasis on more active and inclusive game forms with little or no down time, many team sports, including football, can contribute to national standards three and four, namely, that students participate regularly in physical activity and develop and maintain health-related fitness levels (NASPE, 2004a).

No education in fitness concepts and exercise science appears in this video segment. Teaching the scientific concepts that underlie exercise and physical activity are important in developing physically educated persons (Biren & Rattigan, 2005; NASPE, 2004a, 2006). Examples of exercise physiology concepts that could be included in a lesson like this are listed in table 1, using categories identified in the *Guidelines for Undergraduate Exercise Physiology in a Physical Education Teacher Education Program* (NASPE, 2006).

Table 1 shows only a few of many possible examples of infusing exercise physiology concepts into physical education lessons. Both beginning and experienced teachers, when considering how to expose their students to exercise physiology concepts in a meaningful way, mention time as a major concern (Biren & Rattigan, 2005). Time problems can be reduced in several ways, including the following:

- Be efficient—incorporate more than one concept at a time.
- Use worksheets—for example, answer three questions about health-related physical fitness per day.
- Use health lessons—cover the concepts in health class and apply and reinforce them in physical education classes.

Table 1. Exercise Physiology Concepts that Could Have Been Included

Basic Exercise Physiology

Teacher: "Are we doing a physical activity, exercise, or fitness activity? What fitness components are being used (health-related, skill-related)?"

Metabolism

Teacher: "Is this an aerobic or anaerobic activity? What fuel are you using?"

Cardiorespiratory Concepts

Teacher: "Can this be made aerobic? How?" (Students also can be monitoring and reporting on their heart rate and blood pressure during the drills).

Neuromuscular System/Skeletal Concepts

The activities can be tied into training of the neuromuscular system (reaction time, movement time, etc.). The relationship between physical activity and bone density can be introduced or reinforced.

Body Composition

The activity can be changed, and the changes can be tied into questions to students:

Teacher: "If we make this activity more cardiovascular and add exercises that will develop strength, how does that affect body composition? Why? What is going on in the body?"

• Use homework—assign background reading and quizzes.

Physical education programming at a district level is very important in this regard. With a comprehensive and coherent approach to incorporating exercise physiology principles and health- and skill-related fitness into lessons, most of the examples listed above will become reminders, reinforcing prior learning rather than teaching new concepts.

Alternative Approaches for this Lesson

Lessons such as this, which place students in groups at stations where they work on a skill, can be modified to include more content, higher levels of involvement, and higher levels of activity for all students. For example, after running the pattern and returning to the line, the receiver could do a different fitness drill each time before rotating to quarterback, performing shoulder stretches, pushups, hamstring/quad stretches, or an agility drill. This modification keeps the time on task the same, but replaces down time with strength, agility, and flexibility exercise.

The lesson could be made more active without adding the fitness stations. The lesson involved groups of five or six students, in the four corners of a gym, which had a line of volleyball nets across the center. Alternatively, the teacher candidate could have used groups of three to four students and had them throwing from the volleyball net outwards. This would have allowed five to seven groups of students. The students would have been more active with this arrangement (receiver catches, tosses ball back to the passer, jogs back, and by that time is required to become the new quarterback). Also, there would have been more stations, and thus the students would have learned more pass patterns.

Conclusion

Some of the observations and recommendations described above may seem a lot to expect from an experienced teacher, let alone a beginning teacher. However, in view of the critical issues regarding children's health and the need for physical educators to demonstrate that they are improving that health and helping children become physically educated and fit adults, the authors believe it is time to set high expectations for our teacher candidates and for our role in their education and professional preparation.

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Greg Biren (biren@rowan.edu) and Peter Rattigan (Rattigan@rowan.edu) are professors in the Department of Health and Exercise Science at Rowan University, Glassboro, NJ 08028.

Solmon

Continued from page 16

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Melinda A. Solmon (msolmol@lsu.edu) is a professor in the Department of Kinesiology at Louisiana State University, Baton Rouge, LA 70803.