

Moving and Learning in Physical Education: An Interdisciplinary Approach



A Motor-Development and Motor-Learning Perspective

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How do the organism, the environment, and the task affect motor learning?

The definition of motor development has evolved since its beginning. In 1974 it was defined by a group of developmentalists as “changes in motor behavior which reflect the interaction of the maturing organism and its environment” (“Notes,” 1974, p. 2), and later it was defined as “The change in motor behavior across the lifespan” (Clark & Whittall, 1989, p. 194). The latter definition broadens the scope of the field to a lifespan approach, thus indicating that developmental changes are a continuous process through life. Currently, the field of motor development has been influenced by the dynamic-system perspective, and its definition has changed to reflect this theoretical approach. From this perspective, motor development is “a process of changes in human motor behavior that reflect a dynamical interaction between the maturing organism, the environment and the task” (Kamm, Thelen & Jensen, 1990; Kugler, Kelso, & Turvey, 1982; Newell, 1982).

Interaction of Systems

Today, it is recognized among motor development scholars that a variety of systems (the organism, the environment, and the task) interact with our nervous system to create human movement. The organism systems are represented by anatomical and physiological subsystems, heredity, nature, and intrinsic factors such as the perception and attention of the individual. The environment provides the context of the practical experience; it consists of the teacher, the teacher’s expertise, the previous experiences of the mover, motivation, encouragement, and the equipment used during the task, among other things. The task brings in another set of systems, such as the task demands, the level of difficulty or complexity of the task, physical qualities of the mover (strength, flexibility, endurance), and mechanical factors such as range of motion, balance, and center of gravity. Therefore, movement is a product of the interaction of multiple systems composed of subsystems and components that are constantly interacting and modifying one another. Movement is constantly changing according to the demands of the task, the intention of the subject, motivation, perception of self and others, experiences, nervous system



When a volunteer (at center) missed the catch, the class laughed. With proper feedback, this might have been turned into a teachable moment.

maturation, mechanical forces, changes in length of body components, memory, attention, and more. It is from this standpoint that we will attempt to analyze and explain the events occurring in the context of this middle school physical education class. Any allusion to the teacher's role in this analysis is mainly addressing considerations for teachers in general, and not criticizing this particular teacher, who is in the process of learning how to teach and willingly submitted his video of the lesson for this forum to take place.

Organism

Organism characteristics are the individualities that the students bring into their classes. As teachers we cannot change them, but we can affect them by how we accommodate for these individualities. For instance, when students self-organize themselves in the gymnasium, they often group themselves by morphological similarities such as gender, size, and weight. Grouping in this manner is not necessarily in the best interest of all activities. Therefore, given the characteristics of the groups and the content to be taught, the teachers should decide ahead of time how to group students so as to provide the best learning opportunity for all the students.

In the videotaped lesson, the following organism characteristics were observed:

- Four of the 13 female students appear to be overweight.
- One of the seven male students appear to be overweight.
- Students appear to organize themselves in groups according to gender, size, and weight.
- Other organism aspects are not evident.

Environment

The environment is the aspect of the dynamical system that the teacher can greatly manipulate to create a nurturing and fun context for learning. Learning that occurs in a nurturing environment with positive emotion will become long-lasting because the chemical releases of the brain in this type of experience moves the information learned to the long-term memory. The students on the videotape exhibited a variety of skill levels, and they may have had different levels of experience on these kinds of skills. It would have been more

appropriate to group the students according to their skill level and experiences. This would allow a more challenging experience for all. Also, the opportunity for feeling good and successful about accomplishing the task will increase emotional enjoyment and engagement on the activity.

The environment should be nurturing. For instance, in the first demonstration on the video, a female student volunteers to demonstrate. When this volunteer misses the catch and drops the ball during the demonstration, the class laughs. The teacher missed an opportunity to create understanding among the classmates and to nurture, correct, and encourage the girl, so she would feel more competent and good about participating. In this manner, the teacher could improve the student's catching skills and help the student to become more confident.

Teachers represent a subsystem within the environment; as such, teachers should provide plenty of extrinsic information (feedback) that can help the student refocus and improve performance. Instead of providing general feedback like "good job," which does not necessarily inform the learner, the teacher should provide congruent and specific feedback for the task. Teachers represent the extrinsic information source for students, especially for those students with less experience. Congruent and specific feedback tells the student to focus on the area of the body or combination aspect that they need to pay attention to and modify in order to improve the movement.

In the videotaped lesson, the following environmental characteristics were observed:

- Students' level of experience represented different skill levels and knowledge about flag football.
- Students represented a diverse, multiracial group, which may have different expectations about their role and participation in a flag football activity.
- Learning environment was not nurturing.
- Teacher provided only general observation and general feedback (i.e., "Good job!" "Good catch!" "Good route!" "Good, guys!").

Task

Task difficulty is another aspect that can be easily modified by teachers. Teachers can increase or decrease the difficulty of the task. In the context of this lesson, the task was the same for everyone, even though the students' expertise and experience varied. The combination task presented in the videotaped lesson required the use of three complex skills (throwing, running using concepts of space and direction, and catching while moving). For some students the task may have been appropriate, but others may have benefited from a modification of the task, since their throwing and catching skills were not yet at mature levels of development. Equipment can also be modified to facilitate the throw and catch and to make less-skilled students successful and ready for more advanced tasks. The routes can be simplified at different levels to allow students to challenge themselves. The second task added a defender, which increased the difficulty

level even more, thus losing some student interest, lowering participation, and increasing drop-out.

In the videotaped lesson, the following task characteristics were observed:

- Three skills in combination (throwing, running a route, catching) apply to flag football.
- A concept of space awareness and directionality was applied.
- Several students showed immature patterns of throwing, catching, and running, which increased the difficulty of the task in combination.
- The route increased the complexity of this combination.
- Only one group of students appeared to be ready for the task, which indicated different ability levels within the class.
- The second task added a defender, which added even more complexity to the task.
- As task difficulty increased, the interest of less-skilled students decreased.

Summary

This event represents how the organism, the environment, and the task affect the process of changes in human motor behavior. By the end of this lesson, no change in movement behaviors was apparent. Ignoring the students' individual characteristics—in conjunction with a non-nurturing environment, poor motivation and feedback, and the increasing complexity of the tasks—decreased the opportunities for movement development and the learning of movement behaviors.

Conclusions

This analysis reflects the dynamical interaction between the maturing organism, the environment, and the task. The environment and the task are the aspects that are most capable of being manipulated in a teaching setting to enhance motor development. Both the environment and the task in this episode do not facilitate the motor development and learning of these students.

This analysis demonstrated the importance of the early acquisition of the fundamental motor skills, such as throwing and catching, and the evidence of a proficiency barrier to combining skills when the fundamental motor skills are not acquired earlier (Seefeldt & Haubenstricker, 1982). After consolidation of mature skill patterns, skill combination should be practiced in a variety of conditions before being applied to any sport. In the sport context, teachers should begin with simple combinations according to ability level and increase difficulty as students master previous levels. Teachers need to teach using a dynamic developmental perspective, adjusting the lessons to skill level and experience rather than by grade level.

A gender gap is often evident in skill development, and the gap increases as weight and size increase. This gender gap is due mainly to lack of consideration of ability level and failure to adjust the task difficulty in teaching episodes. A nurturing environment enhances learning opportunities



Adding a defender to the passing drill prematurely increased the difficulty of the task.

and confidence in the learning process. Nurturing is key for embracing individual differences (the organism aspect of the dynamical-system perspective) in the learning process.

Practice is often greater in more confident and skilled students. Therefore, skills and combinations should be practiced in a variety of closed and open conditions. Additionally, appropriate feedback congruent to the skills and combination is needed to enhance the learning opportunities of students.

The process of motor development in many students represents a gap between the maturing organism, the environment, and the task. Many students are missing important previous experience, practice, and knowledge about the fundamental movements, and this becomes a barrier for learning more complex tasks like the ones being taught in physical education classes today. It is the job of physical educators to help students gain the experience, practice, and knowledge necessary for successful movement.

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