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Grounded Technology Integration: Physical Education

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Grounded Technology Integration: Physical Education

Physical education teachers today are expected to have a deep understanding of how educational technologies can assist students in linking specific physical fitness knowledge and concepts to measuring, interpreting, and prescribing appropriate fitness activities. Using digital tools, such as pedometers, heart rate monitors, and exergames, in physical education classes can provide creative and motivating ways to engage in and monitor physical activity. But how can we best choose and integrate these tools into physical education teaching?

Plan First, Then Choose Tech Tools

One way to help teachers integrate technology effectively is to focus on instructional planning. Research tells us that teachers tend to plan instruction according to students' curriculum learning needs, and learning activities are typically content based. We recommend matching technology integration strategies to how teachers plan, rather than asking them to design instruction around a particular technological tool. (To learn more, see "Grounded Tech Integration: An Effective Approach Based on Content, Pedagogy, and Teacher Planning," *L&L*, September–October 2009, pages 22–25).

To assist teachers with technology integration, we offer comprehensive sets of learning activity types (LATs) in 10 curricular areas and suggest specific educational technologies that best support each. The LATs are organized into subcategories so that each content-based collection of learning activity types forms an informal taxonomy. Once teachers have determined the learning goals for a particular lesson, project, or unit, they select and combine activity types in the taxonomy that will best help students achieve the designated goals. Because appropriate educational technologies are recommended for each learning activity type, choosing the activities helps teachers select technologies that support the plan in practical and usable ways. We think of this as "grounded" technology integration, because it is based in content, pedagogy, and how teachers plan instruction.

P.E. Learning Activity Types

We have identified 56 physical education learning activity types. The complete physical education taxonomy is available on the Learning Activity Types site at activity-types.wmwikis.net. Sample activity types with brief descriptions are presented below, along with illustrative (not exhaustive) lists of technologies that may be used to support each. We recommend planning each lesson, project, or unit to include more than one activity from both cognitive and psychomotor categories.

The physical education taxonomy incorporates both physical fitness and motor-skills development activity categories. Physical fitness activity types are divided into those that help students build cognitive understanding (as either knowledge development or application) or psychomotor development (as either practice or application). The motor-skills development section is also divided into cognitive and psychomotor categories.

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Physical Fitness Activity Types

Physical fitness is a physical state of well-being that helps people perform daily activities with vigor, reduces the risk of health problems related to lack of exercise, and provides a fitness base for participation in a variety of physical activities. Twenty-one of the 56 physical education activity types emphasize physical fitness–related cognitive knowledge development and application (see examples in the table "Knowledge Development and Application Activity Types"). Psychomotor learning activity types help learners practice and apply health- and skill-related physical exercises to develop and maintain a healthy lifestyle. Seven physical fitness activity types involve the practice and application of psychomotor skills (see examples in the table "Practice and Application of Psychomotor Skills Activity Types").

Motor-Skill Development Activities

Motor-skill development activity types reflect three stages of motor skill acquisition: understanding, practice, and automatic learning. Combining and sequencing these activities can help students understand, acquire, practice, and perform motor skills automatically. Nineteen of the 56 physical education activity types emphasize motor skill–related cognitive knowledge development and application (see examples in the table "Activity Types Emphasizing Motor Skills–Related Cognitive Knowledge Development and Application").

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Physical Education

Knowledge Development and Application Activity Types

Knowledge Development Activity Type	Description	Technologies
Create a representation	Students develop a representation of a physical fitness concept or process (using text, images, presentation, concept map, etc.)	Drawing software, concept-mapping software, presentation software, video camera
Select a health-related physical fitness test	Students learn the correct form(s) for and choose relevant test(s) to measure a physical fitness component (muscular strength, agility, coordination)	E-books, websites, virtual demonstrations

Practice and Application of Psychomotor Skills Activity Types

Psychomotor Practice Activity Type	Description	Technologies
Evaluate and revise physical performance	Students review, consider, and make changes to an exercise performance based on feedback from teachers and/or peers	Exergames, digital video camera

Psychomotor Application Activity Type	Description	Technologies
Create an exercise or exercise routine	Students create a series of movements to address a particular fitness concept and perform them	Digital camera, digital video camera, presentation software, websites, web authoring software

Activity Types Emphasizing Motor Skills–Related Cognitive Knowledge Development and Application

Knowledge Development Activity Type	Description	Technologies
Plan for collaboration in a game situation	Students develop a strategy or game plan to address specific goals	Concept-mapping software, word processor, spreadsheet

Knowledge Application Activity Type	Description	Technologies
Do movement analysis	Students assess movement patterns and/techniques to improve performance	Movement analysis software

Activity Types for Practicing and Applying Motor Skills for Automatic Performance

Psychomotor Practice Activity Type	Description	Technologies
Refine the performance of each part of the motor skill	Students practice parts of a motor skill separately (for example, a spike in volleyball can be segmented into running, stepping, jumping, and striking)	Digital video camera, movement analysis software, Exergames

Psychomotor Automatic Performance Activity Type	Description	Technologies
Demonstrate/teach the mechanics of a skill	Students share their understanding of a game concept or principle	Digital camera, digital video camera, presentation software, real-time data collection tools

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The nine psychomotor learning activity types focus on practicing and applying motor skills that lead to their automatic performance (see examples in the table "Activity Types for Practicing and Applying Motor Skills for Automatic Performance" on page 35).

In all physical education activity types, affective learning outcomes are linked to explicit cognitive and psychomotor goals. Whether affective learning is a component or the central focus of instruction, we suggest that you employ specific instructional strategies to ensure its inclusion.

Combining Activity Types

The following example illustrates how multiple physical education activity types might be combined and sequenced in a unit focused on cardiovascular endurance:

The teacher begins by posing a series of questions (What is cardiovascular endurance? How do we measure cardiovascular endurance?) to trigger students' curiosity. The students then work with partners to explore the concept of cardiovascular endurance using electronic texts, learning how to calculate heart and target heart rate and measure cardiovascular endurance. Then they organize their ideas using concept mapping software, select the appropriate tool, and test to generate data to answer fitness-related questions.

The students can decide, for example, to measure heart rate during a one-mile walk using a heart rate monitor as a real-time data collection tool. Prior to collecting the data, the students review a web-based virtual demonstration on how to administer the one-mile walk test and how to use the equipment. Then they practice using the equipment by entering sample target heart rates and collecting data by performing a series of movements to elevate their heart rates.

Once the students are ready to apply what they have practiced, they begin gathering data. They complete the one-mile walk, then download the data generated from monitors and organize it for statistical analysis using a spreadsheet. They compare, contrast, and interpret the results using standardized heart-rate criteria and assessment software, such as Fitnessgram.

Based on their findings, each group determines physical fitness goals to improve and/or maintain cardiovascular endurance. Then they create and record an exercise routine to address selected fitness goals using a Flip camera and present their findings using slide-show software.

We invite you to help us to expand, refine, and revise this activity types taxonomy by visiting the Activity Types site and sharing your ideas via the contact link posted there.

Share Your Ideas

Given continual changes in curricula and available resources, the range of physical education learning activity types as well as the technologies that can support each will change over time. We invite you to help us to expand, refine, and revise this activity types taxonomy by visiting the Activity Types site and sharing your ideas via the contact link posted there.

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