Appropriate Use of Instructional Technology in Physical Education

Introduction
The rapid development of technology over the past two decades has provided many new and creative ways for educators to present instructional materials effectively. Until recently, those advancements have focused on desktop technology, which limited their use in physical education. But wireless technology, computer projection systems and physical activity monitoring devices are moving technology into school gymnasiums. The recent development of active gaming or "exergaming" − using video games that incorporate physical activity (Thompson, 2008) − is adding yet another dimension.

The National Association for Sport and Physical Education (NASPE) believes that technology can be an effective tool for supplementing instruction when used appropriately. Therefore, the primary purpose of this document, developed by a task force of NASPE's Physical Education Steering Committee, is to provide guidelines for using technology to help students achieve the National Standards for Physical Education (National Association for Sport and Physical Education, 2004).

Background
Technology has become an important part of work and home environments throughout the country, and that's apparent among the youth population. In a recent study of families with children between ages 6 and 13, the average family home had four televisions, 99% had a DVD player and/or VCR, 88% had a video game console and 85% had a computer. More than half of the families studied also had Internet access, providing children with exposure to a wealth of information never before imagined.

Currently, children entering first grade are estimated to spend an average of 51 minutes per day playing video games and 14 minutes per day using computers, in addition to 172 minutes every day viewing television. By the time children reach age 12, their average "screen time" has increased to 109 minutes of video gaming and 79 minutes of computer usage (Hersey & Jordan, 2007). Although this high volume of use has been named a contributing factor to childhood obesity (Crespo, et al., 2001; Gortmaker, et al., 1996; Robinson, 1999), it also indicates that, when children enter school, they are accustomed to and familiar with technology as one of the primary tools for receiving information.

This is a key consideration for designing and implementing instruction. Teachers now face a generation of students who have never known life without a computer, video game console, cellular phone or Internet access; and that is changing the scope of education dramatically.

Technology tools and exergames can provide objective data on activity levels and creative methods for individuals to engage in physical activity. Studies have indicated that active gaming can promote higher levels of energy expenditure compared to seated video games, as well as increasing heart rate and oxygen consumption (Graves, Ridgers & Stratton, 2008; Lannigham-Foster, et al., 2006).

Pedometers, accelerometers and heart rate monitors also can be valuable tools, providing objective and accurate activity monitoring (Crouter, Schneider & Bassett, 2005; Eston, Rowlands & Ingledew, 1998; Schneider, Crouter, Lukajic & Bassett, 2003; Tudor-Locke & Myers, 2001).

Online learning in physical education using hybrid or blended models (Kachel, Henry & Keller, 2005; Oblender, 2002), can provide valuable Web-based supplemental content through online assignments, readings, chat rooms and examinations, coupled with face-to-face, activity-based sessions (National Association for Sport and Physical Education, 2007). All of those technology tools, however, have inappropriate as well as appropriate applications in relation to effective instruction and facilitating student learning.

The 2006 National School Health Policies and Programs Study (Lee, Burgeson, Fulton & Spain, 2007) indicated that 42% of physical education teachers receive staff-development training on using physical activity monitoring devices; 37% on using technology overall. Also, between 17% and 49% of the teachers studied received additional training for administering fitness tests, assessing student performance, and developing portfolios and individual physical activity plans: areas in which technology can supplement instruction and help in managing data.

Those statistics − in addition to the recent release of updated National Educational Technology Standards for Teachers (International Society for Technology in Education, 2008) – underscore the importance of developing guidelines for proper technology use in physical education that adheres to NASPE standards and guidelines for appropriate practice at all grade levels (NASPE, 2004, 2009a, 2009b, 2009c).

Guidelines for Appropriate Use of Instructional Technology in Physical Education
It is NASPE's position that technology can enhance teaching and learning in physical education. This document outlines four key guidelines to ensuring its proper use in relation to national standards and developmentally appropriate instruction:

> *Guideline 1: The use of instructional technology in physical education is designed to provide a tool for increasing instructional effectiveness.*

Instructional technology is one of many tools that can enhance the presentation of content and convey information to students. It is, however, merely a tool, which physical educators should use only in conjunction with effective instruction. The Internet, "podcasts"(Apple, 2009) and "wikis" (Leuf & Cunningham, 2001) can provide a wealth of information to students, allowing them to receive instruction through portable media devices.

These information-delivery systems have expanded the information available far beyond school libraries. To implement them adequately, though, physical educators must use these resources in conjunction with careful monitoring. Providing students with instruction concerning Web sites' content validity and helping them develop the skills to evaluate the accuracy of electronic information is vital. Ensuring that students understand the difference between sources that have put procedures into place for monitoring content validity and those that have not is necessary for guiding them toward obtaining correct information.

Technology such as projection systems, smart boards and wireless transmission (WiFi and Bluetooth) allow for the display and transfer of information far beyond the traditional chalkboard. Teachers can enhance physical education instruction by using those tools, provided that set-up and/or implementation doesn't reduce student activity time. Planning and preparing effectively in advance of lesson presentation is necessary to ensure that these valuable tools become an integrated part of the lesson with minimal transition time and management.

Physical educators must consider which types of physical activity monitoring devices are suitable for students' developmental levels. Using technology to monitor children's heart rate and comparing the data to adult ratios, for example, or having children use pieces of equipment designed for adults can provide invalid information. Teachers should use these tools to enhance instruction only if the data provided are accurate for the grade level to which they are to be applied.

Before developing and using hybrid online courses in physical education, teachers should have adequate professional pedagogical knowledge for delivering content in the online environment, and their course design should contain interactive communication versus stand-alone content.

Appropriate practice in physical education should include activities aligned to student learning expectations and that fit students' developmental levels, and content aligned to standards. Using technology for technology's sake might not provide relevant instruction experiences for students, since technology is not the curriculum but rather a tool or device to supplement instruction.

Guideline 2: The use of instructional technology in physical education is designed to supplement, not substitute for, effective instruction.

With the infusion of technology into our lives, turning physical education classes into video arcades or health clubs remains a primary concern. When used in physical education, exergaming can provide a gateway toward exposing students to new types of lifetime physical activities and can foster enjoyable physical activity experiences.

Exergames can serve as a means for providing physical activity options to students and as a supplement to physical fitness instruction to support curricular objectives. Merely placing active games, treadmills, ellipticals or other pieces of technology or equipment in gymnasiums and having students participate with minimal instructor interaction or integration of content objectives creates opportunities that resemble recreation more closely than physical education.

Monitoring students' physical activity levels with pedometers or heart rate monitors can provide valuable data concerning exercise intensity and/or duration, but it doesn't provide instruction concerning what levels of physical activity are appropriate for developing health-enhancing physical fitness.

Online courses should offer the type of interactive student/teacher exchange that occurs in the face-to-face classroom, through use of blogging, chats and/or e-mail. Course-delivery technology is designed to supplement the teacher's instruction, not serve as the mode for all instruction.

Physical educators, therefore, must include instructional components when using technology to develop fitness. Providing instruction on recommended levels of physical activity applicable to students' age, including journaling activities and providing assessment of outcomes should form an integrated component of technology use.

Guideline 3: The use of instructional technology in physical education should provide opportunities for all students, versus opportunities for few.

When implementing technology, teachers must continue to adhere to the best practice of maximizing participation and success. All students – not only a few − should benefit from technology. If not enough heart rate monitors, pedometers, exergames and/or computers are available for all students to use them simultaneously, teachers should implement station or circuit formats.

Note: Allowing students to be eliminated during exergaming sessions or using exergames as rewards conflicts directly with appropriate-practice guidelines for physical education (National Association for Sport and Physical Education, 2009a, 2009b, 2009c). Adopting appropriate practices when using technology provides opportunities for students with equal access, maximum participation and minimal wait time and uses activities in which students participate without being eliminated based on skill level.

Guideline 4: The use of instructional technology in physical education can prove to be an effective tool for maintaining student data related to standards-based curriculum objectives.

Using technology to manage student data can provide valuable information to the teacher, parent and student regarding student progress toward program standards and objectives.

Desktop programs such as Microsoft Excel, and Web and CD-ROM software can allow for the collection of data using hand-held computers, with the ability to transfer results to desktop systems quickly. Those technologies can help physical educators determine assessment performance quickly and easily through calculation formulas, and allows them to create and customize individualized fitness plans, as well as offering many other uses.

Motion-analysis software and digital video make student performance evaluation easier, thereby enhancing teacher, peer and individual assessment.

Many pieces of technology, such as heart rate monitors, pedometers and active games, have the ability to track performance, allowing students to document and monitor their progress. However, physical educators must consider the reliability and validity of such devices when selecting the technologies to use.

Students also should be well-versed in using the devices, to prevent an increase in management time and a reduction in student activity levels.

To manage student data effectively, it's important that the teacher spend time using the technology before introducing it into the classroom, and provide effective instruction to students about how to use the technology. That will help ensure that the technology doesn't interfere with achieving lesson objectives.

Implementing technology appropriately into physical education can enhance teaching and learning and contribute to providing a quality physical education program. Technology can aid in content presentation and can help students becoming physically educated individuals who have the knowledge, skills and confidence to enjoy a lifetime of physical activity (National Association for Sport and Physical Education, 2004, 2009a, 2009b, 2009c).

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