Chapter 15

Teaching and Learning with Technology in Physical and Health Education

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Learning Outcomes

After reading this chapter and completing the learning activities you will be able to:

15.1 Identify implications for technology integration of each current issue that physical and health education teachers face. (ISTE Standards for Educators: 1—Learner; 3—Citizen; 5—Designer)

15.2 Select technology integration strategies that can meet various needs for instruction in physical and health education before, during, and after school with school staff and among families and communities. (ISTE Standards for Educators: 1—Learner; 2—Leader; 3—Citizen; 4—Collaborator; 5—Designer; 6—Facilitator; 7—Analyst)

Technology Integration in Action: Developing an Interest-Based, Personal Physical Activity Plan

GRADE LEVELS: 6–8

CONTENT AREA/TOPIC: Life science, health, physical education, technology

LENGTH OF TIME: Problem-based learning over six weeks

(*Continued*)

PHASE 1 Analysis of Learning and Teaching Assets and Needs

Step 1: Analyze problems of practice (POPs)

At the beginning of a new school year, Mr. Martinez, one of the physical education teachers at Ridgeview Middle School, was concerned about the lack of physical activity (PA) among his students. Further, he was unsure if his learners were optimizing healthy eating. He repeatedly observed the students bringing snacks like chips and soda to the gymnasium during and after school. At a recent meeting with the science and health teachers, the physical education teachers were introduced to the scientific method being utilized in science education. The teachers realized that many of the students also were struggling to understand how to evaluate and apply the scientific method.

Step 2: Assess technological resources of students, families, teachers, and the school

Mr. Martinez had recently met with the Director of Information Technology (IT), and he discovered that the school district had a set of 50 wearable devices, such as a Fitbit®, purchased by the Parent Teachers Organization (PTO) using monies collected from a community color-run fundraiser. These 50 devices were not enough to cover all of his students simultaneously but enough to target two simultaneous classes. He could alternate the student usage over a given grading period so that every student could collect personal data using the devices. Mr. Martinez had his own **physical activity tracker**, which he operated when he did his morning runs, so he was very comfortable knowing how to use this technology. At his school, he already was considered a leader in implementing web applications to enhance student learning. However, he knew there were varying ability levels, technology skills, and access to physical activity opportunities among his students and his colleagues. Most students had mobile phones, but he had not seen many students wearing personal fitness trackers at his school. He knew that the students were familiar with Google Apps because their school used G Suite.

Step 3: Identify technological possibilities

Mr. Martinez began collaborating with Ms. Floyd, a science teacher, to develop a problem-based learning project where students would use the wearable devices in physical education, conduct hypothesis testing in their science class, and create a physical activity and nutrition plan displayed through a YouTube video that would serve as the culminating artifact representing evidence of learning and possibly change in behavior.

To examine physical activity, they decided that a wearable physical activity tracker would allow their students to make objective decisions about his or her volume of physical activity and permit each to determine if changes to his or her behaviors were necessary to maintain or improve their physical health. Further, the teachers created an online community of users whereby the students could see the types of physical activity and the locations for activity by other students in the community. Mr. Martinez planned to create visual step-by-step directions for instruction about how to use the FitBit and then how to share the information from the devices. He was hopeful that the use of wearable technologies might also encourage practicing motor skills, like throwing, catching, or shooting a basketball, during the students' leisure time.

To tackle the other half of the energy balance equation and encourage healthy eating, the team decided that an online dietary log would be the most feasible and objective way to track food consumption quality (e.g., eating fruit over candy) and quantity (e.g., how close students come to eating the minimum five servings of fruits or vegetables a day). Recording personal data in a notebook would be limiting and inefficient but by having each student register on the FitBit website, each student could create her or his personal profile for private and educational use. Providing access in this manner permitted students to keep personal information private but granted unlimited access when the students were not attending school.

The integration of both the wearable physical activity and nutrition trackers were intended to help students meet the learning standards in physical education, health education, and life science subject matters and would culminate with students writing case studies of their scientific research about personal physical and health habits and developing a multimedia nutritional plan.

PHASE 2 Design of the Integration Framework

Step 4: Decide on learning objectives and assessments

The teachers agreed on three outcomes, objectives, and assessments.

> **Outcome:** Develop an authentic, evidenced-based case describing regular physical activity participation and healthy eating habits.

- **Objective:** All students will collect personal physical activity and healthy eating data as authentic evidence. All students will demonstrate knowledge of the scientific method by analyzing their own physical activity data by: (1) creating a hypothesis about their daily physical activity (e.g., Am I in energy balance?), (2) collecting personal data, (3) interpreting their data and comparing it to the hypothesis. Each student will use the data to write his or her case.
- **Assessment:** Student learning will be assessed using a scoring rubric to determine the quality of the following factors: (a) sound data collection methods, (b) inclusion of physical activity and nutrition data, and (c) data-based claims.

Outcome: Develop one personal, multimedia-based physical activity/nutrition plan delivered as a YouTube video as a potential solution to the student's personal case.

- **Objective:** The student's individual case results will contribute to creating a personal activity/nutrition plan by (1) synthesizing the information from the case into a reformulated physical activity and nutrition plan, (2) including SMART goals (Bandura, 2001; Bowman, Mogensen, Marsland, & Lannin, 2015; Zimmerman, Bandura, & Martinez-Pons, 1992), and (3) analyzing the plan in relation to national recommendations.
- **Assessment:** Teachers and peers will assess student learning by using scoring rubrics about the appropriateness of physical activity/nutrition plan and levels.

Outcome: Knowledge of the function of the musculoskeletal system.

- **Objective:** All students will demonstrate knowledge of the structure and function of the musculoskeletal system.
- **Assessment:** Series of questions reviewing musculoskeletal system.

Step 5: Design integration strategies and determine relative advantage

The teachers decided that a constructivist instructional approach would be optimal to involve the students directly in data collection and building knowledge about themselves. The plan was to explain the problem-based learning project to the students and develop the following instructional plan and technology integration strategies.

Week 1: In the physical education class, Mr. Martinez introduces the FitBit as the wearable technology, the FitBit **fitness analysis program** which the students use to track physical activity and healthy eating, and proper care of the devices (e.g., recharging, no swimming). During class, the students initialize the device, register for the application, collect sample data, and discuss privacy and security issues. In life science class, students read about and discuss the scientific method. Students design a testable hypothesis based on the wearable technologies and nutrition data.

Week 2: Students in the two classes begin data collection. The health teacher introduces the concepts of energy balance and the importance of healthy eating as it relates to physical activity engagement. In anticipation of producing a multimedia-based, nutritional plan for YouTube, the students learn how to produce and edit a video on school district laptops. Storyboarding and video capture are also discussed as part of the process of developing multimedia storytelling. In life science class, students learn about the musculoskeletal system.

Week 3: Mr. Martinez teaches common ways to increase physical activity and simple nutritional changes (e.g., how to access fresh vegetables). The class generates a list of places where they have been active and identify which activities had the highest engagement. The class also discusses how and where they can get more fruits and vegetables. At the midpoint of the project, the students share the results as a written homework assignment in life science class.

Week 4: The students develop their personal physical activity and nutrition case, which is informed by their experiences and the comparison of their personal data to their hypothesis. Students are taught how to download FitBit data into Google Sheets in order to analyze their data and create charts. The students write their personal cases using Google Docs.

Week 5: To create their personal, multimedia-based physical activity/nutrition plan, the students begin developing their storyboard and scripts based on the critical information included in their personal case to build a multimedia physical activity and nutrition plan. During health class, small groups work on video production techniques (e.g., lighting, placement of people) and learning to use the video editing software to illustrate key physical activity or nutritional goals within their plan or to show local places that encourage physical activity. The students create, edit, and present their videos in class as a means of receiving peer and teacher feedback to ensure the content reflects Specific, Measurable, Attainable, Realistic, Time-bound (SMART) goals.

Week 6: The cases and similar physical activity/nutrition plans are presented in class. Students submit a personal reflection essay, which invites them to apply the ideas from the plans to themselves and to indicate if their physical activity increased.

(Continued)

Relative Advantage

In thinking about the challenge associated with having students become more aware of their physical activity and healthy eating through employing scientific methods, Mr. Martinez and Ms. Floyd together RATified the proposed lesson. Figure 15.1 shows the aspects of instruction, student learning, and curriculum the technology-based lesson would impact. They were particularly delighted to see more transformative effects than ever before by using technology for instruction, student learning, and curriculum. The teachers concluded that there was a relative advantage to conduct the lesson as planned.

Step 6: Prepare instructional environment and implement lesson

The teachers needed to have all of the necessary materials ready to go as the students progressed through the development phases. Mr. Martinez checked out 50 FitBits from the district and prepared his instructional web pages related to their use. Ms. Floyd enlisted the help from the technology specialist to support the instruction associated with filming and video production, uploading on YouTube, and gaining access to Google Docs and Sheets.

PHASE 3 Post-Instruction Analysis and Revisions

Step 7: Analyze lesson results and impact

After the project was completed, the teachers reviewed the physical activity/nutrition plan videos, looked at summary data from the checklists and rubrics, and discussed how the events had unfolded. The teachers observed that most of the students met the outcomes and objectives and were encouraged by how much transfer occurred from the personal case development and physical activity/nutrition plan. The teachers were surprised by the types of physical activity (e.g., mountain biking, paddle boarding, hiking) that students selected to highlight in their video plans that were not introduced during the physical education course.

Step 8: Make revisions based on results

The teachers enjoyed the interdisciplinary project and vowed to implement it again. Next time, they would consider expanding the project to link to national initiatives such as the content included in the Coordinated Approach to Child Health (CATCH, n.d.; Franks et al., 2015; Heath & Colemen, 2002) or SPARK curricula (SPARK PE, 2014a, 2014b) to better facilitate the transfer of knowledge built through this scientific inquiry to the students' lives. They also wanted students to collect data after creating their physical and nutritional plans to assess the plan's impact on students' lives.

Step 9: Share lessons, revisions, and outcomes with other peer teachers

The Director of IT wanted to meet with the teachers to understand how they used the FitBits in physical and health education and science. He was excited about the results and invited the teachers to share their lesson with the PTO members who had purchased the FitBit devices. The teachers decided to involve several of the students in the presentation by having them show examples of the data they collected, their cases, and the physical activity and nutrition plans. Teachers at a few other district schools requested the lesson plan, and the teachers met with them and shared their materials.

Figure 15.1 Mr. Martinez and Ms. Floyd's RATified Lesson

	Instruction	Learning	Curriculum
Replacement Technology is a different means to same end.		• Google Doc facilitates writing of case	
Amplification Technology increases or intensifies efficiency, productivity, access, capabilities, etc., but the tasks stay fundamentally the same.		• FitBit online nutrition log makes collecting food consumption and comparison to guidelines easy	
Transformation Technology redefines, restructures, reorganizes, changes, and creates novel solutions.	• Uses authentic student-collected data to situate content topics (physical activity, healthy eating, and scientific method)	• FitBit allows detailed metrics on individual physical activity • Filmed student physical activity and nutrition plan (YouTube) makes students' enactment part of the learning materials	• Interdisciplinary physical/health education and science lesson

INTRODUCTION

This chapter has two major sections. First, it reviews major issues in the field that shape how technology may be integrated into physical and health education. Second, it describes the integration strategies specific to teaching physical and health education topics. These strategies are introduced and organized around the Whole School, Whole Community, Whole Child (WSCC) model, notably introducing technology integration strategies for physical activity and healthy living: (1) before and after school, (2) during school, (3) with staff involvement, and (4) with family and community engagement. Notice that the last section of this chapter also provides a helpful rubric for self-assessment of growth in how well a teacher is able to integrate technology in this area.

Technology offers conflicting potentials for physical and health education. Technology use has a demonstrated capacity to prevent people from exercising and, as a result, has negative consequences for health. Yet, technology can also offer new and more motivating forms of exercise and offer a wealth of useful online information on how to adopt and maintain healthier lifestyles. As you read this chapter, focus on the key role that all teachers play in making sure that technology use is a benefit to young people's physical activity and health.

Issues and Challenges in Physical and Health Education

According to the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), there have been reductions in physical activity participation and physical education instruction, while there have also been notable increases in childhood obesity and the prevalence of type II diabetes (Ogden, Carroll, Fryar & Flegal, 2015; World Health Organization, 2016). Such changes in the health of school-age children can be linked to personal choices, the environment, and psychosocial variables like attitude and self-efficacy. Across multiple national organizations, schools have been identified as the ideal place to offer school-age children opportunities to be physically active, learn about concepts surrounding physical activity (PA), and make healthy choices.

The Link between Physical Inactivity, Diet, and Obesity

Although there are regional differences, approximately one in every five children ages 6–19 is classified as obese (defined as having an excess amount of body fat), thus placing them at risk for chronic health conditions such as type II diabetes and cardiovascular disease (Ogden et al., 2015). The CDC website reveals facts, figures, trends, and maps of obesity, physical activity, and nutrition data related to the children in your state. Having such a large proportion of obese children is a result of reductions in aerobic fitness, which has been associated with a lack of physical activity participation. Only 25% of all adolescents participate in the recommended 60 minutes of **moderate to vigorous physical activity**, referred to as **MVPA** (Fakhouri et al., 2014). Given the current status of engagement, the need for providing safe and positive opportunities to participate in physical activity in and around schools is justified. The United States Report Card on Physical Activity for Children and Youth (2014) provides a breakdown of physical activity patterning by ethnicity, gender, and age. The report confirmed that the comprehensive efforts to provide physical activity opportunities across the United States have recently received discouraging grades, including a D– for overall physical activity, a D for addressing sedentary behaviors, and an F for providing opportunities to participate in active transportation.

SCREEN TIME AND INACTIVITY Beginning in preschool, children are engaging in excessive amounts of screen time entertainment, which is related to reductions in physical activity (Hinkley, Salmon, Okely, Crawford, & Hesketh, 2012). If this were not cause for

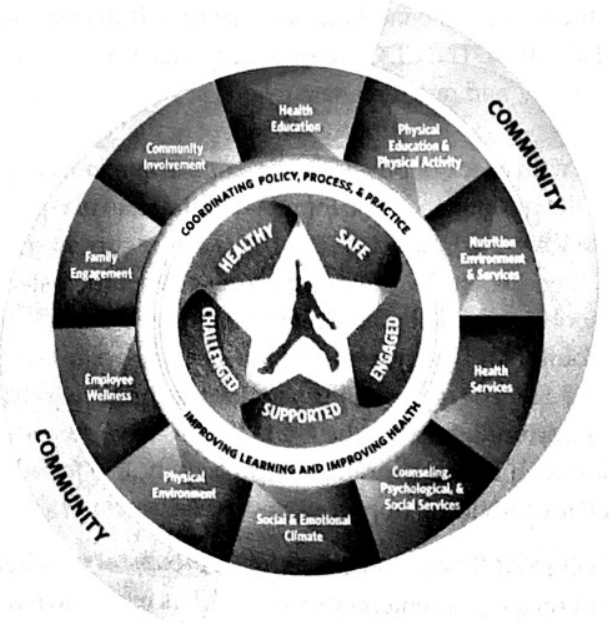
concern in and of itself, participating in screen time for entertainment, independent of physical inactivity, has been linked to disease in later life (Stamatakis, Hamer, & Dunstan, 2011). Playing video games, watching television, and spending time using a computer or tablet are examples of screen time. By the time today's students enter kindergarten, they are spending five to nine hours per day using some form of technology, with the average middle school student using various types of technology for over 15 hours per day through multitasking activities (Strasburger, Jordan, & Donnerstein, 2010). Also, it has been estimated that 41% of adolescents use a computer and play video games for over three hours per day (Kann et al., 2016). Although screen time is regularly associated with sedentary behaviors, there is emerging optimism as physical activity participation more than doubles when screen time involves active game engagement (Lanningham-Foster et al., 2006). For example, active gaming such as Dance Revolution (Konami Entertainment) and Eye Toy (Sony gaming station) increases energy expenditure over sitting by 68% and 40%, respectively.

DIETARY CHOICES According to the Youth Risk Behavior Surveillance System (YRBSS), which monitors the health of youth, there continues to be some positive as well as negative behaviors among the majority of U.S. teens (Kann et al., 2016). Positively, more than half of U.S. adolescents regularly consume one or more fruits (63.3%) and vegetables (61.0%) per day. Despite the prevalence of fruit and vegetable consumption, 57.6% and 20.5% of adolescents had consumed at least one container of a sports/energy drink or sugar-sweetened beverage (e.g., soda pop), at least one or more times in the last week, respectively (Kann et al., 2016). Nationally, 13.8% of adolescents had not eaten breakfast on all of the last seven days, with ninth graders (an average of 14%) and Black teenagers having the highest prevalence of not eating breakfast. Typically, American diets exceed the recommended intake levels and are high in solid fats, sugars, grains, and sodium (U.S. Department of Agriculture, 2010) as the number of fast-food restaurants has more than doubled since the 1970s. Poor dietary choices, such as these, coupled with physical inactivity, have negatively impacted the health of children, which continues into adulthood.

Whole School, Whole Community, Whole Child Model

The most known socio-ecological approach, the **Whole School, Whole Community, Whole Child (WSCC)** model (see Figure 15.2), when implemented as intended, creates a forum for teachers to collaboratively respond to the intellectual and health needs of

Figure 15.2 The Whole School, Whole Community, Whole Child Model



children by formalizing the relationship between learning and health (ASCD & Centers for Disease Control and Prevention [CDC], 2014; Institute of Medicine [IOM], 2013). In shifting the focus from narrowly defined academic achievement to one focused on the full development of children into self-actualized adults, national organizations have called for the unification of parents, educators, businesses, and policymakers, alike, to contribute to this approach. It is believed that health services and the promotion of healthy behaviors are more purposefully integrated into the daily lives of children when this method is implemented, and, therefore, students are more likely to succeed. Given the new evidence that healthier children learn better than their peers with lower physical fitness (Castelli, Centeio, Hwang, et al., 2014), such projects as depicted in the Technology Integration in Action scenario have merit. Because only six states (Illinois, Hawaii, Massachusetts, Mississippi, New York, and Vermont) require physical education in grades K–12 (National Association for Sport and Physical Education & American Heart Association, 2012), interventions using a WSCC approach (Institute of Medicine, 2013) have importance when attempting to increase rates of physical activity participation and healthy eating.

As part of the WSCC model, individual schools are encouraged to implement a **Comprehensive School Physical Activity Program (CSPAP)** (Centers for Disease Control and Prevention, 2013). In the CSPAP approach, which is outlined in the CDC free online resource entitled *Comprehensive School Physical Activity Programs: A Guide for Schools* and shown in Figure 15.3, the primary responsibility of the physical education teacher is to provide learning experiences during physical education lessons that will help students achieve the state learning standards for physical education. Only after this has occurred, which may take a few years for a new teacher, does the physical education teacher begin to identify places before, during, and after the school day where students can practice their learned skills, apply the knowledge acquired, and participate in health-enhancing physical activity. The underlying idea behind this approach is to make physical activity participation and healthy eating a cool thing that students do because it is enjoyable and the natural choice to make.

Figure 15.3 Comprehensive School Physical Activity Program
http://www.shapeamerica.org/about/privacy_policy.cfm

Schools that implement the CSPAP interconnect physical education with four other points of intervention (Castelli, Carson, & Kulinna, 2014; Carson et al., 2014) including:

1. **Physical activity before and after school**—Physical activity before and after school involves active transportation to school (i.e., bike and walk to school programs), physical activity clubs (i.e., runners club, intramurals), and sports activities (i.e., athletic teams).
2. **Physical activity during school**—During the school day, there is a possibility of students having recess, activity periods (usually for secondary students), and physical activity in the classroom.
3. **Staff involvement**—Staff involvement takes two different perspectives: (1) viewing teachers as physical activity promoters and (2) focusing on teacher wellness.
4. **Family and community engagement**—Family and community engagement includes making purposeful connections between what occurs during school and what students can participate in on their own time in a community setting such as at a park or local gymnasium, or by doing recreational sports or 5K runs.

For example, a CSPAP might start slowly by centering on a single event: Instead of the PTA/PTO asking the students to sell candy bars, the parents, teachers, and students work together to organize a community color-fun run. On one Saturday morning or Friday after school, families donate $10 to be given a white t-shirt and the opportunity to run a course, and at specific places along the route, different colors get painted or tossed onto their white shirt. The end goal is to raise money for resources at the school (perhaps new technologies like the wearable devices described earlier in the chapter), while promoting physical activity as a possible option during family time (see Color Carnival Fun Fest, n.d., for more details). In this example, the students in health class plan and prepare the location of hydration stations placed along the running course, the science teacher works with the students to create the course, and the instructional technology teacher helps students create promotional materials for the web page. This example works because it brings together parents, school-age children, teachers, local businesses, and community resources so students can participate in an enjoyable physical activity with their family and friends.

The reality is that, despite 48 states having policies related to physical education requirements (SHAPE America, American Heart Association, & Robert Wood Johnson Foundation, 2016), many physical education teachers face workplace barriers, such as large class size and low academic value (Barroso, McCullum-Gomez, Hoelscher, Kelder, & Murray, 2005), as well as less teaching time than other subject matters (Morgan & Hansen, 2008). Given the reality of these barriers, the technologies outlined in this chapter might be a physical education teacher's best hope for simultaneously addressing physical inactivity, unhealthy eating, and a lack of learning opportunities. Further, wearable technologies and learning communities, despite requiring some screen time, are feasible alternatives that have the potential to get young people moving in health-enhancing ways that span across their whole day and lives.

Application Exercise 15.1 The Comprehensive School Physical Activity Program (CSPAP)

Quality and Instructional Time in Physical and Health Education Programs

National standards, state learning outcomes, and the local adoption of such standards help to frame physical education curricula. Currently, the national standards define what a physically literate and healthy person should know and be able to do as a result of participation in quality physical education programming. The instructional time that educators have with students varies widely.

The idea of **physical literacy**, a disposition that confirms the purposeful application of physical education content as an integral part of daily living (Castelli, Centeio, Beighle, et al., 2014), has existed for some time, but has only recently been applied to physical and health education learning outcomes in the United States. The premise underlying physical literacy is to extend the idea that students should be able to identify where and how to be physically active to the embodiment of a physically active lifestyle. Instead of just knowing about physical activity, the physically literate individual consistently demonstrates the following traits: (1) competence in a variety of motor skills, (2 & 3) knowledge, strategy, and skill use to augment participation positively, (4) personal and social awareness and responsibility, and (5) value in physical activity in their life (National Standards for K–12 Physical Education, 2013). For physical education to be considered a quality experience that has the potential to change behavior and lead to physical literacy, it requires the following elements: opportunities to learn, meaningful content, developmentally appropriate instruction, and student and program assessment (National Standards for K–12 Physical Education, 2013).

The National Health Education Standards (Joint Committee on National Health Education Standards, 2007) have also established a scope and sequence for health education focusing on the development of **health literacy**—the capacity of individuals to obtain, interpret, and understand basic health information along with the competence to use such information to enhance health. To guide teachers and curriculum specialists in fostering health literacy, the National Health Education Standards define eight areas of focus, each with outcome goals in knowledge and application for grades 2, 5, 8, and 12. The standards outline learning outcomes that position students to (1) understand strategies for better health and less disease, (2) analyze social influences on health behaviors, (3) discriminate between valid and invalid health information and products, (4) use intrapersonal communication to promote health and reduce risks, (5) acquire decision-making skills for health optimization, (6) use goal setting to enhance personal health, (7) practice health-benefiting behaviors, and (8) advocate for personal, familial, and community health.

Technology can be used regularly to enhance students' cognitive and physical development and to support critical thinking and problem solving regarding health and physical activity (SHAPE America, 2010). Optimally, teachers have access to technological hardware, such as pedometers, computers or tablets, digital video cameras, heart rate monitors, audio, and projection systems, as well as software, such as word processing, spreadsheets, web browsers, and administrative software.

Although there are quality physical education programs and effective teachers within programs located across the United States, physical education teachers report experiencing the barrier of less teaching time than other teachers (Morgan & Hansen, 2008). Thus, physical education teachers face the dilemma of not having enough opportunities to make a lasting change in students' behaviors, health, and skills. The number of instructional minutes offered by schools varies widely ranging from 30–150 minutes per week at the elementary level to between 45 and 225 minutes at middle and high school levels (SHAPE America, American Heart Association & Robert Wood Johnson Foundation, 2016). Thirty-one states allow students to substitute other activities for physical education, and 15 states still allow students to waive coursework entirely. The American Academy of Pediatrics, the U.S. Department of Health and Human Services, the U.S. Department of Education, the President's Council on Physical Fitness and Sport, and the CDC have indicated the need for more physical education in public schools, and a growing body of evidence

supports the fact that adequate physical activity is crucial for optimal cognitive performance and academic achievement in students (Castelli, Centeio, Hwang, et al., 2014).

Accuracy of Internet Information on Health and Physical Education

When young people search for information related to health and physical education topics, they must have a sufficient level of technological literacy to know how to locate, evaluate, and use the information obtained. The National Health Education Standards indicate that students should be able to access and identify valid information on health products and services (Joint Committee on National Health Education Standards, 2007). The Common Core State Standards reinforce this need, indicating that students should be able to use the web for obtaining information when producing and publishing writing as well as for collaboration (National Governors Association, 2010a; 2010b). Because anyone can post anything on the web, students need to become critical consumers of health and fitness products and information. Specifically, they must be able to differentiate between accurate and inaccurate information. Without this ability, they are unsuspecting consumers of misleading and potentially harmful advice.

With the prevalence of fake (not true) and false (an inaccurate interpretation of valid information) news, today's students need to confirm the credibility of the source of the information. The students should ask, "Who wrote the information?" and "Where did the information come from?" as a way to confirm that the information is coming from an original, not secondary, source. Students should understand that, in relation to health, if the claim is too good to be true, then it likely is fake or false information. Educators must teach students web searching strategies described in Chapter 6.

Handling Controversial Health Topics

Comprehensive School Physical Activity Programs (CSPAP) identify five points of intervention, which were previously described in this chapter (Centers for Disease Control and Prevention, 2013). Such Whole School approaches (Institute of Medicine, 2013) consist of content related to helping students understand ways to promote their personal health and prevent disease; understand the influence that family, peers, culture, media, and technology have on health behaviors; develop skills to access valid health information, products, and services; develop and use interpersonal communication skills to enhance health and avoid health risks; use goal-setting skills to enhance health; practice health-enhancing behaviors and avoid risks; and advocate for personal, family, and community health (Institute of Medicine, 2013). This program recommends adequate time and effective instruction be provided by instructors who are knowledgeable about health education curriculum and have effective instructional strategies to facilitate student learning (Centers for Disease Control and Prevention [CDC], 2013). The Whole School program also recommends identifying health and physical education programs as core subjects.

The variability between state and national policies and perceptions of the controversial nature of some topics has proven a challenge for health education programs. Over the years, special interest groups have pressed for either the inclusion of particular content strands or the elimination of topics based upon the group's individual moral and value systems. An issue that has faced substantial scrutiny is human sexuality. It is currently estimated that 24 states require sexual education in schools; 21 of those states mandate instruction in sexuality as well as HIV/AIDS. Policies for states vary widely, making the adoption of the National Health Education Standards difficult (National Conference of State Legislatures, 2016). Differing state policies may allow or inhibit the inclusion of topics such as rape, suicide, drug use and abuse, violence, and character education. Health educators are continually faced with the challenge of how to provide valid and reliable content information to students while staying within the legal parameters of their state or individual school districts. Directing students to accurate web-based sources can assist in this area.

Check Your Understanding 15.1

Technology Integration Strategies for Physical and Health Education

As described earlier, we recommend schools implement a CSPAP, which interconnects physical and health education with four other points of intervention:

1. Physical activity before and after school
2. Physical activity during school
3. Staff involvement
4. Family and community engagement

As schools and teachers build a CSPAP, they consider how technology integration strategies might advance physical and health education goals within these four intervention areas. Thus, this section will review technology integration strategies that intersect within these intervention contexts. Examine the Top Ten Must-Have Technologies in Table 15.1 for tools that can be integrated in a CSPAP model.

Physical Activity before and after School

Before and after school are ideal times for children to engage in active transportation to school (e.g., biking or walking) and organizational physical activity focused clubs or athletic teams. To start offering physical activity before and after school, visit the The National Center for Safe Routes to Schools (n.d.) website.

ENCOURAGING ACTIVE TRANSPORTATION Since 1969, the number of students that actively transport to school has decreased from 42% to 13% (McMillan, 2009), coinciding with a proportional magnitude of increase in obesity rates (Hedley et al., 2004). When planning a bike and walk to school program, safety should be the primary concern. The good news is that there are likely local resources available for schools. In spite of this, educators can work to inform, incentivize, and coordinate active school transportation utilizing technology to make it more attractive to parents and students. Fitness tracking certainly increases the salience of built-in physical activity participation outside of the school day by providing documentation for total physical activity acquired, but requires the student to have a desire to achieve the health-enhancing quantities of physical activity for long-term adherence. Literature has shown that children who actively transport to school amass about 2,000 extra steps a day (Faulkner, Buliung, Flora, & Fusco, 2009). Having access to data that quantifies and stores this information helps students understand the significant contribution that daily PA has on overall fitness. In addition, mobile technologies can increase active school transport by allaying some parental fears by keeping their child's whereabouts known by using monitoring apps and by providing communication channels, such as a text message or social media "check-in" to let parents know that their child arrived safely at school. Finally, in making the commute to schools, teachers should consider the intrinsic motivation of phone-based games that offer incentives and achievements for actively transporting. Games like Pokémon Go can increase student motivation to actively transport by transforming the commute into gaming time.

SUPPORTING INTEREST-BASED CLUBS OR ATHLETIC TEAMS Before and after school are ideal times for organized, physical activity clubs or teams, such as running

Table 15.1 Top Ten Must-Have Technologies for Physical and Health Education

Technology	Description
Balance It	This resource can create task cards to help develop gymnastics skills. Using visual cues, teachers can select from over 60 hand-drawn images and teaching cues. These task cards are ideal for promoting independent, safe work by students.
BaM Video Delay (Orange Qube)	Bust a Move (BaM) Video Delay is an app that gives the teacher the ability to quickly and automatically record student skill performance efficiently in class settings. The user sets the delay timer and duration to record, and the app allows students to see themselves performing the desired skill to optimize feedback and learning. Annotations, notes, and frame-by-frame mode are among the many options for breaking down student performance.
Team Shake (Rhine-O-Enterprises)	This app allows teachers to quickly and thoughtfully create teams for activities. Teachers can import a list of student names and make variable size teams randomly or control for skill level and gender. Team information can be saved in the app for later use and shared from the app to email and Facebook.
Remind	Remind is a secure messaging app that allows teachers to connect with students for supporting (or reminding) educational goals. Teachers can send instant messages, schedule their communication in advance, attach files and view the read receipts to ensure that students are up-to-date on whatever information the teachers wish to share.
Fitbit Activity Tracking Apps (Fitbit and others)	Fitbit currently has about 25% of the market share for wearable fitness trackers, making it the most prevalent tracker that teachers will encounter. The app provides easy-to-understand graphs pertaining to student steps, MVPA time, heart rate, sleep, and nutrition and a social aspect for sharing this information with friends or educators. Activity tracking apps are emerging technology but allow health and physical educators to make connections beyond the school day.
QR Code Makers	These allow the user to develop QR codes that link to various websites or videos. The codes can then be copied and printed to be distributed throughout a facility. Students can then participate in scavenger hunts in which they scan the code to find the answers to questions related to content. The codes can provide exercise demonstrations and other content information.
Exercise Buddy Visual Exercise System	This mobile application teaches exercise to children with autism spectrum disorders and provides fitness guidance and challenges with visuals aimed to help children learn and participate.
Spotify	Music is a motivation for students, and this application gets them moving and their hearts pumping. Choose from preset playlists specifically created for physical education classes.
MyFitnessPal	This application allows users to establish their fitness and nutritional goals, track their progress in fitness and nutrition, and interface with many types of downloadable physical activity monitoring devices. The food diary section provides the number of calories, carbohydrates, fats, proteins, fiber, and sodium content levels for foods per serving and helps users track their intake levels compared to recommendations in all of the categories. An exercise diary provides a database of various types of activities, calculates the number of calories burned during the exercise setting based on the number of minutes the exercise was performed, and provides other individual user data such as height and body weight. This app connects to social networks allowing users to form support friend groups or share their progress via Facebook.
YouTube	YouTube allows students to create their own videos and upload them to a district- or teacher-directed YouTube "channel" to serve as a portfolio of skill and fitness progression. It also opens the vista of a truly "flipped" classroom in which students are encouraged to engage in physical activity in their free time and discuss what they have learned in class.

clubs, intramural sport teams (e.g., providing recreational opportunities to play a sport activity at a level of competition that is comfortable for the student and is inclusive for individuals with disabilities), athletic teams (e.g., sport activities at a high level of competition), dance and gymnastics groups, active gaming clubs, and Frisbee teams. As an alternative to going home and engaging in screen time in a household where the adults are still at work, clubs and student-led organizations provide a social outlet that involves physical activity. When a club meets, this is a time when music can be played using music **streaming audio** apps, while students run or dance as part of the club's hobbies. Task cards made using Balance It provide prompts for demonstrating the critical movement elements that a student may want to include in his or her gymnastics or hip hop routine. Some physical activity clubs form **online interest-based communities** that link the wearable devices of each student member into a common forum where they challenge each other to complete as many daily steps as they can. Prizes or incentives are sometimes provided for those who demonstrate a personal record or have the most of the entire group. Active gaming clubs use Xbox 360s, Wi consoles, Hop Sports, and Dance, Dance Revolution units to engage students in physical activity as part of game play. Leagues for frisbee golf or ultimate frisbee are popular and often utilize

technologies during competitions, such as timers, specified discs (e.g., one disc is used for distance throws or one for putting), rangefinders, and GPS units.

Physical Activity and Health Education during School

Primary to the concerns of all teachers are the tools that directly augment and improve physical activity and health.

USING TIMING DEVICES Technologies like timing devices have been available for years, but the accessibility of tablets enhances the practicality of having multiple activity stations with time for skill or fitness practice. Instead of the teacher being the timekeeper, students can be empowered to work alone or in small groups while the teacher's role can better be utilized to meet individual needs. For example, a student could use handheld stopwatches, mobile phones, or tablets to time how long it takes another student to complete a given task, such as run a given distance or stacking cups in a pyramid. Because reaction time is a valuable skill in motor performance, the integration of timing devices used by students has merit. Furthermore, the presence of a timing device allows students to transition between movement tasks at her or his pace or on preset intervals set to music. In the setting of a gymnasium where acoustics and class size are not always conducive to the transmission of information verbally, timers allow the teacher to efficiently manage time and give the students ownership of their physical literacy.

MONITORING PHYSICAL ACTIVITY, PHYSICAL FITNESS, AND NUTRITION Sales of devices, like FitBits, Jawbones, smartwatches, and phones, as wearable physical activity trackers have increased dramatically in the past few years, and market estimates predict the trend to continue. The hardware has become more accessible to the public and allows quantification of steps, time in MVPA, heart rate as a representation of how hard someone is working, fitness (resting heart rate), and quantity and quality of sleep. The hardware collects the data, and the software/application represents it in easy to understand graphs and charts that are available in real time and can provide fitness feedback more quickly than traditional fitness testing. The addition of baseline data, collected at the beginning of the year, confirms whether or not a student is making the right process changes to her or his diet and physical activity. Further, applications available on smartphones and wearable technology allow for the use of GPS technology to track distance traveled, provide auditory cues for intervals, and upload data into fitness software. Such applications can calculate the distance traveled and map the travels of an individual or group. Wearable devices and the corresponding software for these devices is now widely accepted and perceived as useful (Kim & Shin, 2015). The inclusion of such devices makes physical and health education classes an optimal context to introduce and train students on the use of these devices to make positive behavioral changes rooted in objective measures.

Other devices to consider are **heart rate monitors, body composition analyzers,** and **spirometers.** Heart rate monitors are especially useful for providing students with

Video Example 15.1 Using Timers and Heart Rate Monitors in Elementary Level Physical Education Class

In this video, see how Mr. Theodore uses timers and heart rate monitors in his elementary school physical education program.
https://youtu.be/EbFs9XyJXIQ

feedback as to whether the students are in their target heart rate zones and benefiting from the training effect for cardiorespiratory endurance (Nichols, Davis, McCord, Schmidt, & Slezak, 2009). Students can also monitor blood pressure with a **blood pressure device**, determine the percentage of body fat with body composition analyzers, and measure lung volume with spirometers. Each device measures a different aspect of health and fitness, allowing students to use their own bodies for data collection and analysis.

In addition to activity and fitness monitoring in the students' hands, **nutritional analysis programs** (software that analyzes calorie intake and monitors portions of required food groups), **fitness analysis programs**, and spreadsheet applications can also be used to calculate and graph proper nutrition and fitness goals. These programs integrate with many physical activity trackers, allowing the merging of nutrition data with caloric expenditure data to facilitate personal fitness development. Applications, like MyFitnessPal, which have a large user-sourced library of nutritional data for foods and fast foods, allow students to understand the energy/nutrients they are consuming in their bodies. All of these technologies have an up front cost in instructional time but allow the teacher to facilitate the transmission of healthy life habits in and outside of the classroom. This makes the potential for real change more likely as the process of fitness is demystified to students who can learn to make better decisions on their own.

USING ACTIVE GAMING AND GAMIFICATION **Active gaming**, sometimes referred to as **exergaming** (Mears & Hansen, 2009), is a technology that requires energy expenditure beyond rest to actually play the game (Hansen & Sanders, 2010; Sanders & Hansen, 2008). Increased situational motivation, physical activity enjoyment, and participation have been associated with the inclusion of active gaming such as Dance Dance Revolution and game systems, such as Nintendo Wii, Xbox Kinect, and Sony PS3, in physical education (Gao, Podlog, & Huang, 2013). Specifically, elementary school students reported having more fun during active gaming than during traditional physical education lessons because there were more opportunities for choice and more frequent peer social interactions (Hansen & Sanders, 2010). Active gaming has been used in two different ways in physical education:

1. An alternative physical activity when the gym or open space is not available
2. A learning center or fitness station in the gym

Some teachers have gone so far as to create a movement lab, a dedicated, always-available space for active gaming that can be used by both physical education and classroom teachers who bring their class to this space. In a direct comparison between the classroom active game lab and traditional physical education lessons, participation in the game lab activities produced significantly more MVPA among typically inactive children (Fogel, Miltenberger, Graves, & Koehler, 2010) because there was greater social acceptability. As such, active gaming, as shown in Figure 15.4, may be integrated as an alternative to sports-oriented game play or as an independent instructional unit.

Gamification is the application of game features as a means of motivating an individual to engage in a particular behavior (Zuckerman & Gal-Oz, 2014). The integration of gamification elements is considered to be more like an immersive technology or a technology pedagogy, where the students participate in different activities to receive digital badges, points, or attain different levels, which create adherence and loyalty to that behavior. When gamification is coupled with the use of physical activity trackers or wearable devices, there is great potential for behavior change such as increased participation in physical activity during leisure time (Zhao, Etemad, & Arya, 2016). The notion of externally motivating individuals with a "token" such as points or attainment of game levels may change behaviors but will likely not sustain the improved behavior (e.g., increased healthy eating). However, the consistent presence of the external motivation may ignite intrinsic motivation within the individual. Elements of gamification

Figure 15.4 Example of Active Gaming
Armando Arorizo/Bloomberg via Getty Images

supporting physical activity and health can be found in the popular, augmented reality, smartphone game, Pokémon Go®. In Pokémon Go, the user tracks digital "monsters" in the real world using the phone's cellular and GPS connections and is rewarded for increased walking distances with badges, power ups, and an increased likelihood of finding rare Pokémon.

One can discriminate between active gaming, gamification, and augmented reality, yet the intended outcome is largely the same across the three; as all intentionally increase physical activity participation and use gamelike features to do so (e.g., the distance traveled in Pokémon Go is used to hatch rare Pokémon as a reward for continued game play). Further, the total amount of physical activity and the intensity of engagement in that activity influences the outcomes of the game (e.g., XBox 360 Kinetic has track events where the faster you run in place, the more likely you are to win the race).

USING VIDEO TO DEVELOP AND IMPROVE MOTOR SKILL PERFORMANCE

Technology-based strategies transform how students can develop their motor skills by providing a unique form of feedback. Video recording applications such as Ubersense, CoachMyVideo, and BaM video are designed to record and playback the desired video loop so that students can analyze their physical performance. The replay and slow motion features of video playback allow teachers and students alike to process motor performance differently. Video and the ability to replay and slow down time augments verbal feedback by providing a new perspective on one's performance. Adding ancillary materials like video clips of experts performing the same movement with instructional cues empowers the learner to focus on his or her specific needs within a given physical education lesson and the teacher to distribute their instructional resources to the entire class more efficiently. Reputable resources, such as the CDC, can provide instructional videos.

Research in the field has indicated that providing students feedback using instructional videos can increase the ability to perform motor skills (Banville &

Video Example 15.2 Using a Video Exemplar to Improve Motor Performance

This video, one from a series by the CDC, narrates and illustrates how to perform specific muscle strengthening activities.
https://youtu.be/QvBJJiWC3gk?list=PL43D95102E29BC901

Polifko, 2009). The use of video is most effective when it is shown to the student immediately after the performance, along with external verbal feedback and cues. This is where mobile applications, such as Ubersense, become very valuable because they allow the instructor to view the video and annotate and record voice-over feedback of the performance, which can be sent to the student via YouTube or other cloud-based web storage sites. Video replay is best used with students who are beyond a beginner skill level. Students need some knowledge of correct skill performance in order to use the information that these images provide. For students with advanced skills, replay also is useful for strategy and tactics. **Sport motion analyzer** software such as Dartfish Video Analysis can be helpful for analyzing movement and giving students valuable feedback; other programs that provide similar analysis and feedback are available. Lim, Pellett, and Pellett (2009) point out that video editing software can also be used to clip parts of sequences to focus on desired movements. Video footage allows a teacher, coach, or the individual to go back and review a performance and break down stages in the skill.

PROMOTING STUDENT LEARNING USING SELF-ASSESSMENT Students can also use technology for self- and peer-assessment to facilitate engagement in their learning. For example, digital video cameras can be placed at learning stations, or students can use mobile technology such as iPad, Flip cameras, or other types of video-recording devices to assess themselves and their peers. Tablets provide the ability to record and immediately review performance. Various phases of skill performance can be recorded, and students can work in small groups to identify critical features, patterns, and concepts associated with the motor skill. In preparation, the teacher develops a skill evaluation checklist or rubric, which evaluates the critical elements of the skill. Then students rotate through stations in small groups. For example, students can work in a group of three with one student performing the skill, the second providing feedback using the checklist/rubric provided, and the third student recording the performance. The ability to integrate cameras with digital video recorders (which have an auto playback function) allows students to perform the skill at one station and then self-assess at the next station by watching the video as it replays.

OFFERING ONLINE COURSES Some schools have begun offering physical and health education as online or blended courses. As with any course, the design and pedagogy differ greatly from class to class. However, these online courses often identify goal-oriented behaviors, such as walking four miles a day, for students to accomplish in a given period of time and progressively increase in activity volume and intensity. Students log their physical activity or upload data from an activity-tracking application, like FitBit, and journal about the experience, complete online training modules that replace the class lecture, and are assessed via quizzes and tests online. When structured and supervised appropriately, online health and physical education may achieve some of the same goals as traditional face-to-face health and physical education classes (Butts, Heidorn, & Mosier, 2013), but it is largely not intended to replace physical education in schools. Online physical education is ideal for students in the following situations:

Video Example 15.3 Video Self- and Peer-Analysis Station for Performance Review

This video shows how students film each other performing overhand volleyball serves and then immediately review and assess their performance.
https://youtu.be/O_H1Nco84Vk

- Children being home schooled
- Secondary education students who have mastered fundamental movement patterns and are ready to independently apply the learned skills in authentic contexts
- Students with cognitive, social, or emotional impairments

Teachers of online courses may utilize a video-hosting website, like YouTube; or **portfolio** software, like SeeSaw or FlipGrid, for students to post clips of themselves performing the targeted motor skills for teacher feedback. Class size may need to be monitored so the instructor can provide best-practice quality instruction. In a study about online physical education in higher education, students were most satisfied with the course when there was a high level of learner-content interaction and quality of the course (Kuo, Walker, Schroder, & Belland, 2014).

Online learning is a relatively new addition to the field of physical education and health. While the potential and convenience of the online environment are beneficial, concerns remain about the efficacy and consistency of these programs in their current state. While the goals of online health and physical educators are the same as their traditional counterparts, the methods they use to achieve these goals are rapidly evolving as technology improves.

PROVIDING EXERCISE AND SPORT OPPORTUNITIES FOR STUDENTS WITH SPECIAL NEEDS **Assistive technology devices** can facilitate communication, participation, and augment the experience to maximize the capabilities of a child with a disability. These can be classified as low tech (e.g., using a bowling ramp), medium tech (e.g., a beeper ball, talking **pedometer/accelerometer**, or response system), and high tech (e.g., Wii gaming system). The Exercise Buddy Visual Exercise System© (Exercise Buddy, L.L.C) is a mobile application that teaches exercise to children with autism spectrum disorders, providing fitness guidance and challenges with visuals aimed to help the child learn and participate. Additionally, tablets, smart phones, and touch talkers can facilitate communication with children who have oral communication disabilities

Video Example 15.4 How Online Physical Education Works

In this video, an online school principal describes her school's online physical education (PE) course.

Box 15.1: Adapting for Special Needs

Adapting for Special Needs in Physical Education and Health Education

Students with disabilities require exercise just as any other student does. In accordance with the Individuals with Disabilities Educational Act, physical education is a direct service that must be offered to all students with disabilities. With individualized modifications (e.g., changing the physical or health education curriculum) and accommodations (e.g., giving the student extra time to respond), students with disabilities can successfully participate in physical activity as part of the physical education curriculum or a Comprehensive School Physical Activity Program (CSPAP). An Individual Education Plan (IEP) should include physical goals focused on improving motor skill and health-related fitness. Because mobility and independence could be an issue, using technologies including touch talkers, iPads, beeper balls, and apps such as Exercise Buddy Visual Exercise System should be part of adapted physical education programming. Following are some resources that can be used with all students as teachers explore the intersection of fitness, health, wellness, and technology.

- **Adapted Physical Education** (at the PE Central website) Provides resources for teachers on how to engage students with disabilities in adapted physical activities.
- **Adapted Physical Education National Standards** (at the APENS website) Provides national standards for adapted PE.
- **Center on Technology and Disability** Provides free, high quality, research-based resources about assistive and instructional technology that supports all students. Includes professional development webinars, articles, and teacher resource materials.
- **Special Olympics** Offers information on sports opportunities for kids with physical and intellectual disabilities.
- **National Sports Center for the Disabled** Adhering to the motto, "Empowering the Human Spirit through Sport," provides opportunities for participation in sport competitions across a variety of the disabilities.
- **National Center on Access** The primary resource on the promotion of recreational activities for individuals with disabilities on which individuals can locate local places to participate in inclusive outdoor and indoor recreational activities.
- **Yoga for the Special Child** With videos and instructional materials, provides materials to help teachers start providing yoga activities for students with disabilities.

—Contributed by Michael Castelli, CAPE

Video Example 15.5 Using Video Clips in Wellness Classrooms

In this video, a principal shares how video examples can be used to illustrate and promote healthy behaviors.

by using the text to speech/speech functions. Exergaming, like the Nintendo Wii, can also help children with disabilities to refine motor skills and maintain fitness. Multiple research inquiries are exploring the concept of exergaming as a form of therapeutic intervention for children with disabilities as well (Foulds, Adamovich, Gordon & Okita, 2010; Gasperetti et al., 2010; Hilton et al., 2014; Morelli, Folmer, Foley & Lieberman, 2011; Taylor, McCormick, Shawis, Impson, & Griffin, 2011). Finally, **sport motion analyzers** can be used to display and capture video of motor performance as individual frames, so that students with disabilities can view their performance of specific critical elements. In general, assistive devices are often created by physical education teachers as a solution to a student need. See the Adapting for Special Needs feature for more resources.

USING TABLETS FOR INFORMATIONAL RESEARCH Tablets and other portable devices also facilitate student-driven research projects completed as an in-class assignment as a means of increasing student understanding of health theories, fitness concepts, game rules, and tactics. In large classes, transitional components such as waiting in long lines for an opportunity to participate or sitting in the bleachers until there is enough gym space available for physical practice can be transformed and made richer by having the waiting students access related resources (e.g., reviewing an example of an overhand volleyball serve on YouTube). Accessing reliable resources that have the potential to increase the quality of movement within physical and health education enhances the likelihood that the students will view this content on his or her own time.

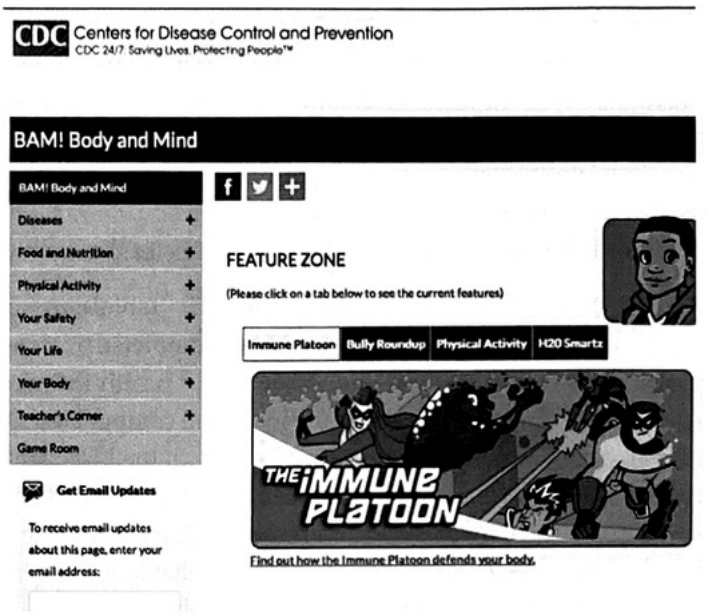
HELPING STUDENTS OBTAIN VALID HEALTH INFORMATION Historically, the health education textbook has been the primary source of information and reading material in health education classes. Today, the web and various software packages provide students with access to a rich variety of additional materials. KidsHealth (see Figure 15.5) is an example of a health-related site targeted at K–12 students. Another good source is the CDC (see Figure 15.6), which has information and materials designed for people of all ages and for special populations.

High-quality software includes the Body Awareness Software (BARN) Series I and II (Learning Multi-Systems) for middle and high school students, and the Core Learning

Figure 15.5 KidsHealth Website

Source: © The Nemours Foundation/KidsHealth. Reprinted by permission.

Figure 15.6 CDC Body and Mind (BAM!) Website
Copyright © Centers for Disease Control and Prevention. http://www.cdc.gov/bam/

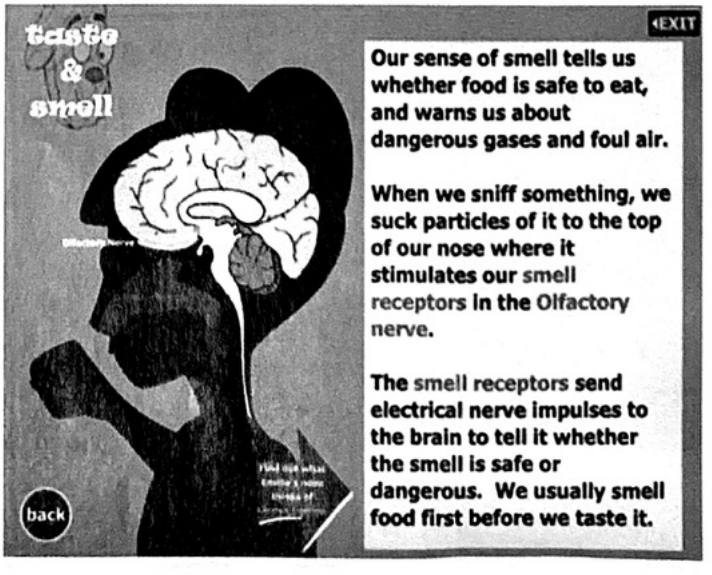


series on health that has an appealing format and engaging activities on a variety of topics (The Body, Illnesses and Injuries, Staying Healthy, Becoming an Adult, and Emotional Health; see Figure 15.7 for an example from The Body). Children and teenagers can use these and other resources to research health topics, including the side effects of commonly used medicines, or symptoms of major medical illnesses.

Young people are turning to the web to obtain information on various topics, including some that may be controversial in nature, preventing teachers from engaging in direct classroom instruction. However, as noted earlier, students need instruction on how to distinguish between accurate and inaccurate information. Review Chapter 6 suggestions for teaching web search strategies and evaluation of information.

USING PEERS AS PERSUASIVE PHYSICAL AND HEALTH MODELS According to social learning theory, peers are powerful persuaders through observing what they say or do as well as what they do not say or do (Atkin, 2000). Traditionally, health messaging has employed an expert, like a physician, to make claims like "smoking is bad for

Figure 15.7 Explore Your Body Software (Core Learning Series)
Source: Interactive health lesson from Core Health I Course, published by Core Learning. Reprinted by permission. www.core-learning.com



your health," but words from an expert have been shown to do little to boost message impact (Atkin, 2000). Physical education teachers are well positioned to draw attention to peer models as examples of decision making, which may be health enhancing. Video resources are an efficient way to remove logistical hurdles when teaching health-related issues. They allow students to hear information and advice from a voice other than the teachers. They also enable students to see health issues in real-life settings and view models of healthy behaviors. Positive, action-oriented messaging can also be enacted during lessons. For example, the Technology Integration in Action scenario at the beginning of the chapter exemplifies the persuasive power of peers in developing cases and physical activity/nutrition plan videos, which stimulates the sense that the messages apply to the target audience's (the students') experiences and lives. Moreover, when messages are action oriented and positively worded, they are more likely to resonate with viewers. As such, the problem-based learning series of activities described earlier are personalized, experiential, and action oriented. This idea is similar to marketing strategies applied in social media campaigns (Joyce & Harwood, 2014).

Classes in various parts of the world can collaborate on projects such as studying local safety or behavior issues. When they complete their research, they work together on developing a web page or other product that documents healthy behaviors. Students also are able to discuss the differences between various cultures with regard to subjects such as drug use or government-sponsored health care. The unique structure of the learning space utilized in physical and health education can act as a facilitator of technology-rich learning. Technology Integration Example 15.1 combines the use of research and peer learning for students to examine nutritional aspects of caffeine.

Staff Involvement

As part of implementing the CSPAP, a comprehensive effort to partner with other teachers will increase the likelihood that student physical activity participation and healthy eating habits will be improved. Several integration strategies facilitate staff involvement in a physically active and healthy school environment.

Collaborative projects, like the one between Mr. Martinez and Ms. Floyd in the opening scenario, move physical education teachers out of isolation and into an equal

Technology Integration

Example 15.1

TITLE: What's the Buzz? Exploring Concepts about Caffeine

CONTENT AREA/TOPIC: Health, biology

GRADE LEVELS: 8–12

ISTE STANDARDS•S: Standard 1—Empowered Learner; Standard 3—Knowledge Constructor; Standard 6—Creative Communicator; Standard 7—Global Collaborator

CCSS: Reading: Informational Text-Key Ideas and Details (RI.9–10.1)—Reading: Informational Text-Integration of Knowledge and Ideas (RI.9–10.8)

DESCRIPTION: Before the lesson begins, have students collect and bring in containers from drinks that have caffeine. Discuss how much caffeine each student has consumed in the past three days and the effect that caffeine has on the human body. Read and discuss scientific information on the effects of caffeine. Tell the students that they will work in groups to explore how caffeine affects the body, how common it is in various consumer products, and whether its use in consumer products is regulated in any way. Then assign each group a focus question and have them put together a dramatic skit intended to teach their peers about their specific question. Have students use video cameras to record the skits to post on SchoolTube.

SOURCE: Based on concepts from "The Buzz about the Buzz: Learning How Caffeine Affects the Body," a lesson plan at the Learning Network: Teaching and Learning with the *New York Times*. http://learning.blogs.nytimes.com.

partnership with other subject matter teachers. The website, PE Central, provides a section of peer-reviewed lesson ideas for integrating physical education content into other subject areas. SPARKPE has developed a series of lessons and activities aligned to Common Core State Standards, which merge physical education content with literacy and language arts instruction (SPARKPE, 2014a, 2014b). Technology Integration Example 15.2 describes several ways in which physical education and content area teachers can collaborate to support interdisciplinary learning.

TECHNOLOGY-BASED ACTIVITY BRAIN BREAKS With the emerging evidence that active students learn better than inactive students (Castelli, Centeio, Hwang, et al., 2014), many classroom teachers have been encouraged to provide activity **brain breaks** during their lessons to invigorate and attentionally reset their learners from prolonged durations of desk work. Web-based resources like GoNoodle, Hop Sports, and YouTube provide predesigned activity content that students can follow along with after the classroom teacher simply presses play. These video content sites have a relative advantage for generalists' convenience by largely being free, abundant in content, and of durations of under a minute to over 30 minutes in length. Further research is warranted in this field, but generally speaking, teachers can find activity brain breaks that may calm or energize their students with PA, such as free music videos designed for children that get students up and singing, dancing, jumping, or moving to the music.

PROMOTING TEACHER WELLNESS There are different ways that staff can be involved in the promotion of physical activity and health. Many schools have "Biggest Loser" type weight loss initiatives for faculty and staff, often coinciding with the new year, whereby the staff is encouraged to exercise and be weighed a couple of times throughout the duration of the event. Technology and fitness tracking allows for these events to be more efficacious by supporting process goals like daily physical activity based on recommendations, while accounting for and encouraging physical activity obtained throughout the day. A physical educator can create a group where staff can upload their physical activity

Technology Integration

Example 15.2

TITLE: Interdisciplinary Activities for Physical Education Concepts

CONTENT AREA/TOPIC: Physical education in content areas: mathematics, biology, history, geography

GRADE LEVELS: 6–8

ISTE STANDARDS•S: Standard 1—Empowered Learner; Standard 3—Knowledge Constructor; Standard 5—Computational Thinker; Standard 6—Creative Communicator; Standard 7—Global Collaborator

CCSS: Mathematics-6.NS.B.3,—7.RP.A.3,—Language Arts-RI.6.1,—W.7.2,—W.8.4—(This is a sample of potential standards only.)

DESCRIPTION: Technology-based strategies can help teachers integrate other content areas into physical education to create interdisciplinary lessons. Students can monitor and evaluate progress toward personal fitness goals and achievements as part of electronic portfolios; analyze and graph data from their use of heart monitors and/or pedometers (mathematics); log participation and skill acquisition scores achieved while participating in active gaming; use tablets to video record and analyze individual and peer performance, develop instructional video projects, or participate in orienteering or geocaching activities (geography/social studies); view videos that demonstrate model performances, various sports, and other motor activities to learn more about how the body works (biology); and use the web to research sports and physical activities in other countries and historical periods (history).

SOURCE: Based on Mohnsen, B. (2000). Vaughn, Nekomi, and Luis: What they were doing in middle school physical education. *Learning and Leading with Technology, 27*(5), 22–27. Also see Mears, D. (2012a). Physical activity monitoring devices: Types, policies guidelines and recommendations. In Steve Saunders & L. Witherspoon (Eds.), *Contemporary uses of technology in K–12 physical education: Policy, practice and advocacy*. Charlotte, NC: Information Age; Witherspoon, L. (2012). Active gaming. In Steve Saunders & L. Witherspoon (Eds.), *Contemporary uses of technology in K-12 physical education.* Charlotte, NC: Information Age.

data and not only be held accountable for meeting recommended physical activity, but also compete with one another to be the most active, thus doing what many initiatives do not: supporting process goals over product goals like weight.

Family and Community Engagement

The CSPAP model also targets involvement of family and the community in working toward overall wellness. Technology can support connections between schools, families, and the community. Many schools utilize applications, like Remind, to push out reminder notices and school information to students and their families. A health or physical educator can use this program to send out helpful health tips to parents. Digital portfolios (YouTube channels, Dropbox accounts, Google documents, or specialized software like SeeSaw) can allow parents a window into what their children are doing in PE and Health classes.

Technology can encourage family MVPA through the following resources:

- **Exergaming**—Presents the opportunity for games that require physical activity to play in which the entire family can participate. For example, the Just Dance game for the Wii plays music from all genres and allows an interactive dance performance to be scored like a game. Earning bragging rights in the home for the dance moves can be fun!
- **Place-based or augmented reality games**—Geocaching and Pokémon Go foster increased MVPA and can do so in a way that is fun with motivation predicated on additional "discoveries" that gamify the acquisition of MVPA.
- **Home video game consoles**—A substantial library of exergaming games exist for the Nintendo Wii, Xbox One/Kinect, and PS4. Particular to the Xbox One/Kinect, families can access home exercise routine videos ranging from very vigorous cardiovascular training (with infrared HR detection) to yoga with skill feedback being provided in the form of points based on video detection of the movements being executed properly.

Video games have largely been considered a sedentary pursuit, but health and physical educators can inform their students and families about the healthier, active options available.

Application Exercise 15.2 Technology Integration Strategies for Health and Physical Education

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Teacher Growth in Technology Integration Strategies for Physical and Health Education

While the information in this chapter introduces key issues and technology integration strategies and resources for physical and health education, it is important to continue working toward fully articulating a plan for using these technologies throughout the curriculum to transform your teaching and your students' learning. Review the rubric in Table 15.2, which measures a teacher's progress in integrating technology in physical and health education.

Teachers or those who support them need to identify and keep in touch with state and federal agencies to track changes in standards, curricular requirements, and funding opportunities. Consider joining the professional organization, SHAPE America, for updated information, resources, standards, and professional development.

Table 15.2 Rubric to Measure Teacher Growth in Technology Integration for Physical and Health Education

Part I: Teachers' Knowledge of Physical and Health Education Issues and Challenges			
	Basic Knowledge (1–2 points)	**Intermediate Knowledge (3–4 points)**	**Advanced Knowledge (5–6 points)**
	I can articulate the nature of the issue/challenge.	I can both articulate the nature of the issue/challenge and identify some of the possible ways to address it.	I can articulate and implement my own plan for addressing the issues/challenges in my own teaching.
The link between physical inactivity, diet, and obesity	❑	❑	❑
Whole School, Whole Community, Whole Child model	❑	❑	❑
Quality and instructional time in physical and health education programs	❑	❑	❑
Accuracy of Internet information on health and physical education	❑	❑	❑
Instruction in controversial health topics	❑	❑	❑
Part II: Teachers' Technology Integration Strategies for Physical and Health Education			
	Basic Knowledge (1–2 points)	**Intermediate Knowledge (3–4 points)**	**Advanced Knowledge (5-6 points)**
	I can describe the strategies and identify technologies to carry them out.	I have designed at least two activities based on these strategies to enhance my teaching and my students' learning.	I have designed and implemented my own plan for integrating these strategies throughout my curriculum to enhance my teaching and my students' learning.
Encouraging active transportation with technology	❑	❑	❑
Supporting before/after school interest-based clubs and athletic teams	❑	❑	❑
Using timing devices	❑	❑	❑
Monitoring physical activity, fitness, and nutrition	❑	❑	❑
Using active gaming and gamification	❑	❑	❑
Using video to develop and improve motor skill performance	❑	❑	❑
Promoting self-assessment of student learning	❑	❑	❑
Offering online courses	❑	❑	❑
Providing exercise and sport opportunities for students with special needs	❑	❑	❑
Using tablets for informational research	❑	❑	❑
Helping students obtain valid health information	❑	❑	❑
Using peers as persuasive physical and health models	❑	❑	❑
Using technology-based activity brain breaks	❑	❑	❑
Promoting teacher wellness	❑	❑	❑
Encouraging family and community engagement	❑	❑	❑
Encouraging teacher growth in integration strategies	❑	❑	❑
Total Points	_____ **of 126 possible points**		

Video Example 15.6 The Benefits of a SHAPE America Membership

In this video, the teacher shares how her SHAPE America membership benefited her throughout her career.
https://youtu.be/3GXDfgRtmMc

Finally, teachers can participate in professional conversations on Twitter by using the following hashtags or Twitter accounts:

- #physEd or #PE
- #healthEd
- #schoolwellness
- #gbl (game-based learning)
- @CDCgov
- @WHO

Check Your Understanding 15.2

Shared Writing 15.1 Collaboration with Physical and Health Educators

Chapter 15 Summary

The following is a summary of the main points covered in this chapter.

1. **Issues and Challenges in Physical and Health Education**—Teachers in physical and health education face the following issues:
   - The link between physical inactivity and unhealthy diet with an increase in childhood obesity
   - Implementing a Whole School, Whole Community, Whole Child approach that provides the infrastructure to bring together all school and community resources to address such health issues such as obesity, social and emotional health, and other health risks
   - Developing a high quality physical and health education program, often without adequate instructional time
   - Accuracy of Internet information on health and physical education
   - Handling controversial health topics
2. **Technology Integration Strategies for Physical and Health Education**—Technology-enabled strategies are introduced in the following four categories:
   - **Physical activity before and after school**—Includes technologies encouraging active transportation to/from school and supporting interest-based clubs or athletic teams.
   - **Physical activity and health education during school**—Includes technology strategies that support using timing devices; monitoring physical activity, fitness, and nutrition; using active gaming or gamification in instruction; using video to develop and improve motor skill performance; promoting self-assessment of learning; offering online physical and health courses; supporting exercise and sport for students with special needs; using tablets for informational research; helping students obtain valid health information; and using peers as models.

- **Staff Involvement**—Includes technology strategies that support activity brain breaks and teacher wellness.
- **Family and Community engagement**—Includes technology strategies for encouraging family and community engagement.

Teachers should continue learning technology integration strategies through immersion in the physical and health education professional organizations and through online communities of practice.

Technology Integration Workshop

1. Apply What You Learned

In this chapter, you learned about teaching and learning with technology in physical and health education. Now apply your understanding of these concepts by doing the following activities:

- Reread Mr. Martinez's lesson *Developing an Interest-Based, Personal Physical Activity Plan* at the beginning of this chapter. Pay close attention to Step 3 of Mr. Martinez and Ms. Floyd's TTIPP when they identify the technological possibilities for their problem of practice: increasing students' physical activity, optimizing healthy eating, and engaging in the scientific method. Using your knowledge about technology integration strategies for physical and health education introduced in this chapter, generate at least one new technological possibility for targeting Mr. Martinez and Ms. Floyd's problem of practice.
- Review how Mr. Martinez and Ms. Floyd RATified the lesson in Step 5 of the TTIPP, as represented in Figure 15.1. Use the RAT Matrix to analyze the role(s) and relative advantage that your new technological possibilities (identified in the last step) would play in the lesson. You must reflect on the roles your identified technological possibilities play as replacement, amplification, and/or transformation of instruction, student learning, and/or curriculum. Do you feel your proposed technology would provide relative advantage?

2. Technology Integration Lesson Planning: Evaluating Lesson Plans

Complete the following exercise using the Technology Integration Examples 15.1 and 15.2, any lesson plan you find on the web, or one provided by your instructor.

a. Locate lesson ideas—Identify three lesson plans that focus on any of the technologies you learned about in this chapter, for example:
- Timing devices
- Physical activity, fitness, and nutrition monitoring devices
- Active gaming or gamification
- Video to develop and improve motor skill performance
- Online physical and health education
- Exercise and sports for students with special needs
- Web-based informational research
- Student self-assessment
- Peer modeling

b. Evaluate the lessons—Use the Technology Lesson Plan Evaluation Checklist and the RAT Matrix to evaluate each of the lessons you found. Based on the evaluation and your RATification of the lessons, would you adopt these lessons in the future? Why or why not?

3. Technology Integration Lesson Planning: Creating Lesson Plans With The TTIPP Model

Review how to implement the TTIPP Model (see Figure 2.6) for technology integration planning, and use Mr. Martinez and Ms. Floyd's lesson *Developing an Interest-Based, Personal Physical Activity Plan* in this chapter as a model. Create your own technology-supported lesson that uses physical or health education technologies to support learning by students by doing the following activities:

a. Describe Phase 1—Analysis of Learning and Teaching Assets and Needs:
- What is the problem of practice or main content topic in your lesson?
- What are the technology resources that your students, their families, you, and your school could bring as assets to the lesson?
- What are the technological possibilities for helping to solve or help the identified problem of practice? Identify the technology(ies) you will integrate into the lesson and ensure that you have the skills and resources you need to carry it out.

b. Describe Phase 2—Design of the Integration Framework:
- What are the objectives of the lesson plan?
- How will you assess your students' accomplishment of the objectives?