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PEDAGOGY

Perceptions of Physical Education Teachers Regarding the Use of Technology in Their Classrooms

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Abstract

The purpose of this study was to determine the perceptions of physical educators regarding their accessibility to educational technology, the availability of technical help, and specific obstacles to incorporating technology in their classrooms. Respondents were 201 adapted and general physical education instructors who taught at middle and high schools in two large school districts in the Southwestern United States. Respondents completed three sections of a previously validated survey utilized in a nationwide 2011 educational technology study involving literacy teachers. Results indicated the top available technologies for instruction were laptop computers, digital projectors, computer labs with Internet connections, iPods, and pedometers. High percentages of respondents indicated they had a sufficient level of available technological support from library/media specialists, school administrators (for obtaining resources), in-school and district technology coordinators, and other teachers in their building. The top perceived barriers to implementing educational technology were lack of understanding of how to integrate technology, lack of incentives to use technology, lack of time because of high-stakes testing, difficulty of managing a classroom when students are using computers, and lack of technical support. A comparison of these results with previous research demonstrates a rapid recent increase in school use of educational technology and underscores the need to help physical education teachers better

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incorporate new technology in their classrooms. Results also provide a baseline from which future studies may track the progress of technology use in physical education classrooms.

Technology is an essential tool to help physical education teachers deliver quality instruction (Browne, 2015; National Association for Sport and Physical Education, 2009; Society of Health and Physical Educators, 2017). A report by the Office of Educational Technology (2017) concluded that educational technology has the potential to provide equity and accessibility in learning so that all learners can access information resources. In physical education, access to technology is particularly important with the availability of new phone applications focused on physical activity tracking and proper nutrition; consequently, student usage is expected to become more feasible in the future (Beale, 2012; Ptomey et al., 2015). New applications that help teachers track students' behavior and students' progress and that engage students in learning new information and improve their skills can be downloaded to a phone or tablet computer. Portable Bluetooth sound system devices and portable projectors that present video or slides are additional technologies physical education teachers can use. However, despite prominent calls for integrating technology into instruction and the widespread availability of Internet access in schools, the integration of technology has not kept pace with developments outside of classrooms and schools (Jones, Baek, & Wyant, 2017).

Ouyang and Stanley (2014) analyzed various theories of learning in regard to educational technology and identified specific benefits students receive when technology is integrated into the classroom. These benefits include a greater potential interest in the activity, more collaboration between students, a potentially greater number of trials, quicker feedback, and better connectivity of the learning activity to outside life. Consequently, it appears important that teachers correctly and flexibly use a variety of educational technologies to make their instruction more effective.

Researchers have identified a number of barriers to implementing technology in education including not enough time within a class period, lack of access to technology, lack of technical support, not enough time to plan for integrating technology into instruction, insufficient time to teach basic computing skills, lack of incentives to

integrate technology, inadequate professional development for integrating technology, time demands of high-stakes testing, and equipment failure or malfunction (An & Reigeluth, 2011; Hutchison & Reinking, 2011; Jones, Bulger, Illg, & Wyant, 2012; Lee, Park, Whyte, & Jeong, 2013; Razaghi, 2014; Rogers, 1999). In addition, teacher reluctance to incorporate technology can also be cited as a barrier, because they do not believe it will enhance the quality of their instruction or they do not believe it is worth the time or cost to do so (Wyant, Jones, & Bulger, 2015). Generally, research on the use of instructional technology in physical education is limited (Browne, 2015; Kretschmann, 2015).

The purpose of this study was to determine the perceptions of adapted and general physical education instructors regarding their accessibility to specific forms of technology, the availability of technical help, and obstacles to incorporating technology in their classrooms. This research was deemed important because there is a need to help physical educators identify helpful technology and successfully overcome barriers preventing them from implementing technology in their classrooms. In addition, research on the use of instructional technology in physical education is limited (Browne, 2015; Kretschmann, 2015).

Method

Respondents were adapted and general physical education instructors who taught at K–12 public schools in two large school districts in the Southwestern United States. This study used three sections of a previously validated survey that was utilized in a nationwide study involving 1,441 K–12 literacy teachers (Hutchison & Reinking, 2011). This survey instrument was chosen because of the potential to track the progress of educational technology in K–12 schools over 6 years (2011–2017). That survey was initially developed by a panel of experts who surveyed the educational technology literature and developed a set of constructs. Three of the constructs were (1) specific technologies available for teaching, (2) availability of technical help for teachers, and (3) specific obstacles to incorporating technology in classrooms. Survey items for each construct were developed and pilot tested with a group of 100 K–12 teachers. Cronbach's alpha for internal consistency ranged from .88 to .96 for the constructs guiding development of the survey (Hutchison & Reinking, 2011).

For this research, those three sections were used with the exception that some additional physical education–specific technology items were added to the list of available technologies (i.e., accelerometers, pedometers). A demographic section solicited demographic items, including age, years of certified teaching experience, teaching assignment (Adapted Physical Education, General PE, or Other), and grade level. Prior permission to solicit and analyze this data was provided by the university institutional review board.

Respondents were initially identified through a random sample of elementary, middle, and high school physical education teachers in two counties in the Southwestern United States in October 2017. E-mail addresses were secured through district directories. An e-mail including a Qualtrics link and asking them to participate in the study was sent to their e-mail addresses. Approximately 250 e-mails were sent to potential respondents; however, several were returned as incorrect or nonfunctioning. Respondents were also encouraged to forward the survey link to other physical educators. A reminder e-mail was sent to the respondents approximately 2 weeks after the initial mailing. Respondents were informed of the purpose of the research, that the survey was confidential, and that they were required to complete an informed consent form prior to accessing the survey. At the end of 4 weeks, the data were downloaded from Qualtrics into an Excel spreadsheet.

Results

Of the 201 respondents, 122 (60.7%) were female and 79 (39.3%) male. The mean for teaching experience was 9.4 years. Approximately 90% of the respondents indicated their primary teaching assignment was general physical education, 8% were adapted physical education teachers, and 1.5% gave no indication. Approximately 47% indicated their primary teaching level was K–5, 35% taught Grades 6 to 8, and 22% taught Grades 9 to 12 (i.e., several of the respondents indicated more than one level).

A majority of the respondents indicated that some of the technologies were not available for them, including heart rate monitors, interactive whiteboards, and accelerometers. However, over three quarters of the respondents indicated they had access to digital projectors; computers connected to the Internet (PE classroom); computers connected to the Internet (in a classroom); student e-mail,

and pedometers, iPad, laptop, and computers (personal use; see Table 1). The percentages for a number of the available educational technologies were much higher than for the 2011 national survey of literacy teachers (Hutchison & Reinking, 2011), most notably, student e-mail (61.7% vs. 11.4%), laptop computers for teacher use (86.6% vs. 41.1%), digital projectors (84.6% vs. 66.7%), iPods (72.6% v.s 5.8%), document camera (55.2% vs. 15.3%), digital video recording equipment (59.7% vs. 32.0%), and laptop computers for each student (50.7% vs. 12.3%). The percentages for technical support were also higher for this survey than for the 2011 survey (Hutchison & Reinking, 2011), specifically, library/media specialist (84.6% vs. 70.5%), another teacher who assists with technology (67.7% vs. 48.0%), and in-school technology coordinator (70.1% vs. 31.9%). High percentages of respondents indicated a sufficient level of available technological support from library/media specialists, school administrators (for obtaining resources), in-school and district technology coordinators, and other teachers in their buildings (see Table 2).

Table 1
Physical Education Teachers' Perceptions of Technologies Available for Instruction

	Yes		No	
Survey question	**%**	***n***	**%**	***n***
Laptop computer(s) at school for your personal use	86.6	174	13.4	27
Digital projector(s)	84.6	170	15.4	31
Computer(s) connected to the Internet (in a designated classroom)	78.1	157	21.9	44
iPod	72.6	146	27.4	55
Computer(s) connected to the Internet in school (outside of physical education classroom)	72.1	145	29.9	56
Pedometers	71.6	144	28.4	57
Student e-mail	61.7	124	38.3	77
Digital video recording equipment	59.7	120	30.3	81
Document camera	55.2	111	44.8	90
Laptop computers for each student	50.7	102	49.3	99

Table 1 (cont.)

	Yes		No	
Survey question	**%**	***n***	**%**	***n***
Personal Data Assistant (PDA) for your use	49.8	100	50.2	101
Heart rate monitors	48.3	97	51.7	104
Interactive whiteboard(s)	35.8	72	64.2	129
Accelerometers	32.3	65	67.7	136

Table 2
Availability of Technical Support for Using Technology

	Yes		No	
Survey question	**%**	***n***	**%**	***n***
Library/media specialist	84.6	170	15.4	31
Administrative support (for obtaining resources)	77.1	155	22.9	46
District technology coordinator (for techical support)	77.1	155	22.9	46
In-school technology coordinator (for technical support)	70.1	141	29.9	60
Another teacher who assists with technology	69.7	140	30.3	61
District technology coordinator (for instructional support)	65.2	131	34.8	70
In-school technology coordinator (for instructional support)	59.2	119	30.8	82

Responses for the 4-point (0 to 3) Likert section pertaining to obstacles to integrating technology into physical education were compressed into two categories so that they could be reported as percentages: (1) not a barrier or to a small extent and (2) a moderate or large barrier. The items that had the highest percentages of a moderate or large barrier were (1) lack of understanding to integrate technology in literacy instruction (68.5%), (2) lack of incentives to use technology (67.8%), (3) lack of time because of high-stakes testing (66.7%), (4) difficulty of managing a classroom when students are using computers (66.7%), and (5) lack of technical support (62.1%; see Table 3). Chi-square comparisons of the responses by gender revealed females were significantly more likely than males

to perceive a number of the items as moderate or large barriers to integrating technology into their physical education classes. These items included a lack of time both to prepare for and to teach classes that integrate technology, not being able to find reliable educational technology, and not being provided sufficient technology-related professional development.

Table 3
Perceptions of Physical Education Teachers Regarding Obstacles to Integrating Technology Into Their Classrooms

	Moderate or a large extent		None or to a small extent	
Obstacle	**%**	***n***	**%**	***n***
Lack of understanding to integrate technology in literacy instruction	68.5	137	31.5	63
Lack of incentives to use technology	67.8	135	32.2	64*
Lack of time because of high-stakes testing	66.7	132	33.3	66*
Difficult managing classroom when on computer	66.7	132	33.3	66*
Lack of technical support	62.1	123	37.9	75
Lack of professional development to integrate technology	58.2	114	41.8	82
Lack of time to prepare for using technology	58.1	115	41.9	83
Thinking that technology doesn't fit my beliefs about learning	57.4	113	42.6	84
Lack of access applicable to technology	57.4	113	42.6	84
Lack of time during class	57.1	113	42.9	85
Internet text too difficult for students to read	55.8	110	44.2	87
Not knowing how to evaluate student when online	54.8	109	45.2	90
Not knowing how to incorporate technology and teach content	54.8	108	45.2	89
Difficulty controlling information students access online	53.5	106	46.5	92
Lack of understanding of copyright issues	50.8	101	49.2	98

Table 3 (cont.)

Obstacle	Moderate or a large extent		None or to a small extent	
	%	*n*	%	*n*
Lack of time to teach students complex tasks	50.7	101	49.3	98*
Lack of support from school administration	48.0	94	52.0	102
Not knowing how to use technology	46.7	92	53.3	105
Not knowing how skilled students are using technology	42.9	85	57.1	113
Thinking technology integration not useful for classes	34.8	69	65.2	129
Considering technology to be unreliable	34.2	68	65.9	131

*Significantly higher female than male percentages at $p < 0.05$.

Discussion

Similar to Hutchison and Reinking (2011), this study shows that the lack of time, incentives, understanding, and access were the primary obstacles to utilizing technology in the classroom successfully. Since time for instruction and learning is limited during a class period, it is understandable why participants rated those survey items as moderate to large barriers. In addition, some of the respondents may have felt comfortable in their ways, with no incentive to learn how to implement new technology into their teaching (Wyant et al., 2015). With constant new technological advances, it may seem overwhelming for some teachers to be constantly having to learn new programs and teach their students to use them (O'Neil & Krause, 2019).

For a majority of instructors attempting to implement technology in their classroom setting, one of the main areas of concern was a lack of sufficient technical support at their schools. Butler and Sellbom (2002) stated that specific faculty members should be identified to assess and evaluate the effects of technologies on learning on their campus. This will allow other teachers at the school to implement technology and make them want to learn new areas they are not accustomed to. It is encouraging that over 65% indicated receiving an adequate level of technical support from their school admin-

istrations and that their districts have a technology coordinator to prescribe technical support. However, in contrast, it is concerning that 62% cited a lack of sufficient technological support as an obstacle to integrating technology into their classes. This finding suggests that given the rapid improvements in technology, teachers may feel a need for additional support to "keep up" with new applications. That is, even though support personnel is provided, it is not perceived as being sufficient when instructors need immediate help or want help in determining how to integrate new technology into their teaching (Buabeng-Andoh, 2012). For example, new technology such as cell phone applications are becoming available frequently and it is challenging and time consuming for teachers to keep up with those advancements.

It is interesting that females were significantly more likely than males to identify barriers such as a lack of time both to prepare for and to teach classes that integrate technology, not being able to reliable educational technology, and not being provided sufficient technology-related professional development. These findings suggest that males may have an edge in utilizing technology in teaching physical education. Future research can address the effectiveness of technology in in-service education to narrow this gap for female physical education teachers.

In conclusion, while physical education and literacy teachers are two different groups of educators, the findings demonstrate the rapid increase in education technology and technology support in K–12 schools over 6 years (2011–2017) and are consistent with other research findings (Wastiau et al., 2013). Because research on the use of instructional technology in physical education is limited (Browne, 2015; Kretschmann, 2015), these results provide a baseline that may be compared with subsequent studies.

A great way to integrate technology into more physical education classrooms would be to offer to teachers monthly workshops that emphasize strategies related to these specific areas (McNeill & Fry, 2012). Each workshop could provide demonstrations of how instructors can save time with a particular type of technology and could show how different types of technologies can be used for different purposes or tasks within their classrooms. Informative sessions of this type would provide teachers with hands-on practice

with the technology, which would likely lead to later use with their classes (Goktas, Yidirim, & Yildirim, 2009).

Because physical educators are responsible for providing a standards-based curriculum, integrating technology can take time away from other activities during classes. Given the importance of moderate to vigorous physical activity, physical educators may not have sufficient time to devote to technology-based activities such as digitally tracking calories or recording fitness scores. However, the integration of technology in physical education is important because it has the potential to empower students to utilize that technology for self-directed moderate to vigorous physical activity outside of class via cell phone and tablet applications, digital exercise measures, and heart rate trackers (Browne, 2015; Beale, 2012).

This study was limited to 201 physical educators in one Southwestern state. Researchers could include a larger sample size and focus on comparing the responses of adapted and general physical educators to determine different obstacles they have encountered, particulary because adapted physical education instructors are required to create more activity modifications for their students. Because the lack of time, for a variety of reasons, was a main reason the physical educators were not able to implement technology effectively into their teaching, researchers could interview physical educators to determine reasons they feel they have little time to learn about, implement, and use technology within their classrooms. Because the pace of technological change is so fast, it appears important to frequently survey both students and teachers to track the progress of the implementation of educational technology, particularly in regard to measuring student physical activity outcomes. Future research should also track the effects of other formats such as Google Classroom and other innovative class communication applications (McNeill, Mukherjee, & Singh, 2010; Ouyang & Stanley, 2014).

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