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Technology and Physical Education: Present, Possibilities, and Potential Problems¹

Stephen Silverman

This paper will address the use of technology in physical education teaching and teacher education. Both computer and other electronic devices are considered. Current uses and some possibilities are discussed, as are some problems that have or may occur with the increased use of technology in physical education. Current uses include using computers for word processing and data management, assessment and teaching, computer and video-assisted instruction, and telecommunications. Four potential problems are identified: (a) have versus have not; (b) physical activity versus technology; (c) is this the best way to teach?; and (d) the teacher educator.

Physical education is an area within the field of kinesiology where technology can play an important role. Whether technology is integrated into physical education probably depends on the individual school or teacher education program. Technology's role can be expanded and clearly will be important as we move to a more technologically advanced society. Teacher education candidates and physical education teachers have and will find many aspects of technology to enhance their work. This paper will address three aspects of technology in physical education: (a) where we are now—the present; (b) where we can go—the possibilities; and (c) what can go wrong—potential problems. In addition, I will address the use of technology for physical education teaching and teacher education. This paper will primarily be informative. I provide references where appropriate and in many instances provide Uniform Resource Locator (URL) addresses to help readers find information on the World Wide Web.

Where Are We Now: The Present

For many years there has been literature on the use of technology for teaching physical education. The Educational Resources Information Clearinghouse (ERIC) and a number of journals have included research and applied articles on the use of technology in teaching and teacher education in physical education. The

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more general education literature also has provided resources helpful to physical educators. Recently Bonnie Mohnsen (1995a) published a book as a resource for physical education teachers that provides lots of basic information for those who want to use technology in their teaching.

Current Uses of Technology in Teaching Physical Education

There are a variety of uses of technology in physical education. They can be categorized as (a) computer uses and the use of (b) other electronic devices. In some instances (e.g., computer-assisted instruction), computers and other devices are used together, but I have chosen this classification system to make the presentation easier and more useful. The first part of this section will explore the use of computers and then other electronic devices will be addressed.

Computers can be used by physical educators in three areas: (a) utilities, (b) assessment, and (c) computer-assisted instruction. The use of computer utilities, such as word processing programs and data base managers, is probably the most common among teachers and can help them be more productive. Having lesson plans, assignments, tests, handouts, and other teaching materials in a word processor makes their use and revision much easier than in the past. Once information is stored on a computer, teachers can share with each other and easily modify teaching materials for their own purposes. Data base managers, such as spread sheets and other specific applications for recording and storing data, also have seen extensive use. Teachers have used a variety of applications to store and retrieve grades and other data and to calculate new information, such as final grades on a unit. As many have found at all levels of education, the use of a data base manager has made calculating grades an easier task—especially for larger classes.

The use of computers for assessment in physical education has great promise but appears to be mostly used in fitness assessment. Hinson (1996) describes the use of an Apple Message Pad for recording student performance in many areas that can then automatically be uploaded to a desktop computer and used with other data. This essentially replaces the teacher's notecard or grade book during testing and eliminates the need for transferring information from one source to another. The computer also can be used for a variety of other assessment purposes, for example motor skill, and integrated with computer-assisted instruction. Mohnsen, Thompson, and Mendon (1996) show many creative uses of computers for assessment and teaching.

Fitness assessment and reporting is perhaps the area in which computers are most used in physical education. Widely used computer programs, such as the one provided with the FITNESSGRAM (URL: <http://www.cooperinst.org/5.html>), cosponsored by the Cooper Institute for Aerobic Research and Prudential Insurance, allow teachers to record data, provide feedback to students and parents with a "report card," and to keep records from testing session to testing session and from year to year. The ability to keep and use longitudinal data provides great possibilities for using fitness information in formative evaluation and to emphasize the continuing improvement of fitness—instead of providing a summative evaluation that may not have many educational benefits. Other fitness software, such as those provided by Bonnie's Fitware (Mohnsen, 1995b), permit similar uses in fitness testing. In addition, as any experienced observer will note, teachers have adapted a variety of data base utilities to assist with their physical activity and fitness programs.

Current Uses of Technology in Physical Education Teacher Education

For the sake of this paper, I am categorizing teacher education as a life-long process that occurs from preservice education until retirement. Many of the technological uses in teacher education are similar to those used in teaching. It is interesting, however, that inservice teachers are helping each other to learn how to use technology in their daily work. This exciting development is occurring on-line and off and suggests that the future of physical education will require the quick dissemination of technological uses by teachers to other teachers—otherwise the technology will be old before teachers can implement it.

Because many technology uses for teacher education are similar to those of teaching, I will not repeat the computer uses involving utilities and assessment. These are available, but the more interesting uses of computers in teacher education are occurring for (a) continuing education and (b) through telecommunications. While these two uses of computers could be seen in a similar way, I have separated them to highlight the exciting work that has occurred in the past few years.

Computer use for continuing education has come to physical education. In the fall 1996, a 15-hour Internet course was sponsored by the California Physical Education Home Page (URL: <http://www.stan-co.k12.ca.us/calpe/>) for physical educators—from California and elsewhere—who wanted to participate. It included information on the National Standards for Physical Education, the California Physical Education Framework, and FITNESSGRAM testing. It used E-mail, chat sessions, a virtual auditorium, listservs, and the World Wide Web. Participants could complete the inservice training from any computer with an Internet connection. At about the same time, Virginia Tech University announced a World Wide Web, computer-based master's degree program for physical education (URL: http://infoserver.etl.vt.edu/coe/COE_admin/programs/hpe/hpe_p.html). As Internet-based education develops, other universities and organizations may pursue distance education as a method to provide advanced education in physical education.

Telecommunications have clearly increased the dissemination of information and the discussion among physical education teachers and teacher educators in just a very short time. The use of E-mail, listservs, and the World Wide Web has resulted in virtual discussions among those interested in physical education (Elliott & Manross, 1996a, 1996b). At least three listservs have been introduced in physical education and they have increased communication among professionals. USPE-L, sponsored by Virginia Tech University, is directed to teachers and teacher educators. It currently has more than 500 members and is very active among its members. Typically, teachers ask for suggestions and others respond with a variety of solutions. Some recent topics have included providing rationale to support physical education with school boards, uses and minimum technology skills for physical education and physical educators, coed versus single sex physical education, activities for beginning teachers to establish management procedures, and many others. The sharing and goodwill evidenced on this list are impressive. PHYSED-L, sponsored at the University of Illinois at Urbana-Champaign, primarily is directed to pedagogy researchers and includes graduate students and faculty on five continents. AUSTPE-L is a similar list for physical educators in Australia. Anyone interested in subscribing to these lists should send me an E-mail and I will send directions for subscribing and participating in the listservs.

The World Wide Web provides many resources for physical education teacher education. These can be organized as (a) generic education resources, (b) organizations, and (c) specific resources for physical education. Generic education resources for educators are plentiful on the Web. Among the most useful are AskERIC (URL: <http://ericir.syr.edu/>) that provides access to much of the ERIC data base and has organized collections of typically asked questions by teachers and parents and includes research-based answers. The Mid-States Regional Educational Laboratory (McRel, URL: <http://www.mcrel.org/>) has standards for most subjects taught in public schools, including physical education, and has links to other federally supported labs and other useful information. As a final example, the United States Department of Education (URL: <http://www.ed.gov/>) has many of its publications and resources available on-line where they can be read, printed, or downloaded to a word processing program.

A number of professional organizations provide resources on-line for educators. The American Alliance for Health, Physical Education, Recreation and Dance (URL: <http://www.aahperd.org/>) and the American Educational Research Association (URL: <http://aera.net>) are two organizations that provide valuable home pages and links to others of interest. In addition, a growing number of state associations of health, physical education, recreation, and dance are providing on-line resources.

The specific resources for physical educators shows the great potential of the World Wide Web for physical education. For example, Project SPARK (URL: <http://www.foundation.sdsu.edu/projects/spark/index.html>), a research-based evaluation of health-related physical education from San Diego State University, provides information and resources for physical educators. The access to this information on-line helps disseminate both the research and the educational materials that were developed.

Clearly, the most exciting aspect of physical education on the Web was the launch of PE Central (URL: <http://infoserver.etl.vt.edu/~pe.central/>) by George Graham and his students at Virginia Tech University in August 1996. This group has been a leader in physical education on the Web and this project has shown the ability of the group to combine their knowledge of physical education and computers to the benefit of many. PE Central has too numerous resources to report here, but includes assessment ideas, lesson plans, equipment information, job information, and links to many other physical activity sites. Physical educators looking for resources on the Web should start here.

The use of video technology in teacher education has been used for many years. Videotaping of performance for both supervision and evaluation of preservice teachers is a common aspect of many teacher education programs. Other uses of video technology are not well-documented. O'Sullivan, Stroot, Tannehill, and Chou (1989) do show one use of interactive video technology in physical education. It should be noted that while there is not a lot of interactive video in physical education teacher education, the application of this technology is more widespread in other areas of education.

Where Can We Go: The Possibilities

It is difficult to project the future and, therefore, this section will be relatively short. Clearly, there can and will be an expansion of the use of technology in

physical education. I will provide some possibilities for both teaching and teacher education but, of course, there are many others.

In the future it is possible we will see technology permeate all areas of school physical education. Technology will assist with instruction by providing demonstrations and interactive learning activities, monitoring physical activity and fitness activities of children and providing feedback for teachers to improve their lessons, and all instruction and assessment will be integrated with the automatic recording of data and a quick provision of feedback. Mohnsen (1995b) shows that this may be closer in some areas of the country than we might think.

In teacher education, we can expect many advances in technological applications. Video assessment and monitoring of teacher education students and teachers can provide valuable methods of feedback to teachers and may help assure accountability. Interactive video learning can be used to help teachers and teacher education students to learn about virtually any discipline, activity, or pedagogy-related topic, and the interactive feature can help teachers customize this to their own needs. The availability of virtual instruction on the World Wide Web may provide access to many physical educators whether or not they are associated with a university.

The use of telecommunications in teacher education clearly will grow and will be available from preservice to retirement. An example of extensive telecommunications in a teacher education program already is available in education. The Teaching Teleapprenticeships program (URL: <http://mac246.ed.uiuc.edu/tta/>) at the University of Illinois at Urbana-Champaign is funded by the National Science Foundation and integrates computer technology into all aspects of the teacher education program. Computers are used for finding and posting information, for getting help from others on newsgroups, and for university faculty interaction with students in practica. Teacher education students learn to use applications, utilities, the resources of the Web, and E-mail—and integrate the technology into their planning and teaching. It has had good success, while research has shown that there are a few problems with electric communication for supervision (Thomas, Clift, & Sugimoto, 1996). The training of physical educators to integrate technology in their teaching is coming and this model may show one usable road to navigate the path.

What Can Go Wrong: Potential Problems

Having spent time discussing the uses and potential of technology, it is appropriate to acknowledge that technology will not be a panacea for physical education. There are problems with its use—despite the topic of the Academy meeting and the coverage in this monograph. I have organized the problems into four categories that I believe summarize some of the concerns we should have.

Have Versus Have Not

Like many experiences in our society, middle and upper income individuals have access to things lower income individuals do not. If you doubt this, I urge you to visit your local elementary school and another in an economically deprived area. The contrast in resources in most communities is striking.

School districts have attempted to improve access to technology for all schools. Funding always is an issue when upgrading computer resources in schools.

School districts, in an attempt to provide technological equipment, have ignored training and other more generic educational needs (Mehlinger, 1996; Peha, 1995; Weiss, 1996). Unfortunately, it is likely that this new focus will increase and not ameliorate the disparities that occur in schools. If only certain students have access to technology in their gymnasias and classrooms, we will not be serving the general educational purpose of providing access to all in our society. School districts, administrators, and physical educators will need to pay special attention to the distribution of technology to all students.

Physical Activity Versus Technology

Those using technology must consider the impact of technology on the physical activity levels of students in physical education. It seems likely that some types of technology may reduce physical activity and be counterproductive to the goals of physical education. We will need to examine what purpose the technology serves and whether it promotes skilled, healthy, enjoyable physical activity. It is possible for this to occur, and it also is possible for technology which is inventive and interesting to be used, but that does not help reach the goals of many physical education programs.

Is This the Best Way to Teach?

Lots of educational technology still is at the drill and practice stage and is boring (Callister & Dunne, 1992; Pepi & Scheurman, 1996). We may replace a dynamic and interesting teacher with less interesting video or computer application. Students may not learn as much or develop an enthusiasm for the subject if the technology is not as good as instruction delivered by a good teacher. In addition, good software must be used as intended and modifications in time and setting may make it less effective (Van Dusen & Worthen, 1995), and a poor teacher probably will still be a poor teacher with the computer (Solomon, 1992).

The Teacher Educator

Perhaps the biggest hurdle to the use of technology in all areas of educational practice is the teacher educator (Michael Waugh, personal communication, August 1996). Often students have more advanced computer and technology skills than those teaching them in colleges and universities, and technology is not used and modeled in teacher education classes. Technology must be integrated into teacher training if future teachers are going to employ it in their teaching. In turn, teachers must also be technologically literate and want to use technology to integrate it into their curriculum (Ritson, 1995). This problem may disappear over time, but both teachers and teacher educators will have to learn to use technology if it is to be integrated into physical education.

Summary

Despite the problems, the growth in the use of technology in physical education has been impressive. There is great potential for its use, but we need to see where technology can help and where it is appropriate. The resources for teachers on the Web and through other sources is great, and it is likely that all physical educators will need to have the skills to evaluate and use technology if it is to have a large impact on our field.

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Notes

¹When I was invited to present this paper at the Academy meeting I was surprised. While I thought that President-elect Rainer Martens was nice to ask, I also thought there were those who knew more about the topic of technology in physical education. Although I am technologically literate and extensively use computers and other technology in my work and research, I had not spent much time thinking about the use of technology in physical education teaching or teacher education. In order to complete this paper, I had help from others that was invaluable. In particular, I would like to thank George Graham of Virginia Tech University, Bonnie Mohnsen of the Orange County (CA) Department of Education, and Michael Waugh of University of Illinois at Urbana-Champaign for discussing this topic with me and providing me with many ideas.