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Imbedding New Technologies into Current Practice: A Guide for Administrators of Physical Education

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ABSTRACT

IMBEDDING NEW TECHNOLOGIES INTO CURRENT PRACTICE:

A GUIDE FOR ADMINISTRATORS OF PHYSICAL EDUCATION

By

Thomas J. Haeck

July 2005

Many new technologies are available to the Physical Education teacher, yet few are commonly used. This project contains findings from a review of literature regarding Physical Education technology use in today's schools. The guidelines presented in this project were designed to facilitate the integration of Physical Education technology into the schools curriculum. The project was designed with the fundamentals of the constructivist classroom in mind, as well as including all students in the process. Students from historically marginalized groups, low socio-economic status, high and low achieving students, students with physical exceptionalities and special education students were all included in this project. All activities were designed to maximize the potential of the school, district, students and teachers.

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CHAPTER I

INTRODUCTION

In the world of education, technology can drastically alter the way teachers perform their craft; much like technology changes the way that people in other lines of work do business. Teachers make use of new instructional tools and techniques to help them better educate their students. Teachers in every subject area and grade level make use of emerging technologies and Physical Education teachers are no exception. Physical Education teachers throughout the country are willing to embrace the new technologies that are available to them, but there are challenges ahead. The training and staff development programs for Physical Education teachers to learn to use their technology are not working, in many instances there are limited incentives for the teachers to want to learn. The staff development programs need to educate the teachers as to how and why the use of these new technologies is important in their teaching. This paper will explore why professional development for Physical Education teachers is so important, and the different ways in which quality technology education for Physical Education teachers will help improve the use and implementation of new technological tools into the classroom.

This project will discuss ways in which to include all groups of student into the Physical Education technology plan. Students with exceptionalities, high achieving students, low achieving students, low socio-economic status students, as well as students from historically marginalized groups. All of these groups are an important part of every

school and need to be included in the technology program. They also need equal access to all technologies and need a chance to succeed.

Many new technologies are available to the Physical Education teacher such as pedometers, heart rate monitors (HRM), body composition scales, handheld electronic grading and assessment tools, electronic portfolios, development of Physical Education-related listservs, Physical Education-related bibliographic support, Physical Education software development, and proliferation of web-related resources for the K-12 based Physical Educator. If so many new technologies are available for the Physical Education teacher, then why are so few teachers actually utilizing this technology? Is it because they reject the notion of getting away from their traditional way of instructing? Or is it more likely that they have never been trained on how to properly integrate these new technologies into their curriculum. Many preservice teachers fail to understand how technology can support Physical Education instruction and how effective Physical Education teachers can be when incorporating technology into their daily teaching routines.

According to the U.S. Congress, Office of Technology Assessment (1995), the lack of teacher training is one of the greatest roadblocks to integrating technology into a school's curriculum. That same report revealed that most school districts spend less than 15 percent of their technology budgets on teacher training and development.

Such a figure makes it easy to understand why Moursund (1992) contends that current educational systems have done a miserable job empowering teachers to

appropriately and effectively use computer-related technology in the classroom.

Many of today's teachers do not have computer skills that are sufficient to teach with the technological tools that are available. "Today's students, of almost any age, are far ahead of their teachers in computer literacy." National Educational Technology Plan (2004). It is time that every teacher held competencies in technology use, including Physical Education teachers.

PURPOSE

The purpose of this project is to create a training guide for the appropriate use of technology in Physical Education. The guide will assist administrators of Physical Education and school staff so that they can organize their Physical Education teachers in the process of implementing new technologies into their current practice. Technology is an under utilized educational tool for Physical Education teachers and knowledge of how to use available technologies is absent in many public schools. Integration of this guide into the current curriculum will assist administrators of Physical Education and provide appropriate technology based experiences for teachers and students.

SIGNIFICANCE

By creating this guide the author's intention was to design an avenue with which Physical Education teachers can begin to include technology into their curriculum. Technology is shaping education and Physical Education should not be left behind. Physical fitness improves students' academic performance, communication skills, and teaches them how to live happier and more productive lives. A considerable amount of

research was reviewed in the area of educational technology and technology specific to the domain of Physical Education.

LIMITATIONS OF THE PROJECT

The activities included within the project were not meant to be used with the students. Rather they are meant to be used by educators to better organize themselves in order to implement Physical Education technology in their current curriculum. It is meant to be used for the improvement of Physical Education curriculum. Professionals choosing to use these ideas and activities may need to make some adaptations to the suggestions and thoughts contained in the guide in order to best meet their individual school's needs.

The focus of this project is to provide avenues through which Physical Education teachers can integrate technology into the current practice, and further serve as role models to other teachers and current professionals. The lessons and activities found within this project are meant to assist with the infusion of technology into a school's existing Physical Education curriculum.

The guide is for practicing teachers and administrators and is a resource for teachers to enhance professional practice. It is designed for improvement in the Physical Education technologies and not meant for use in any other subject areas.

DEFINITION OF TERMS

Computer-Assisted Instruction- is a narrower term and most often refers to drill-and-practice, tutorial or simulation activities offered either by themselves or as supplements to traditional, teacher directed instruction.

Didactic tools- A broad range of objects including educational television, assistive technology, and simulation games.

Electronic portfolio- Uses electronic technologies, allowing the portfolio developer to collect and organize portfolio artifacts in many media types (audio, video, graphics, text). Electronic portfolios are used to help students create personal practice plans, develop fitness and wellness programs, and compile demonstrations of their learning over time. These portfolios provide a collection of work that demonstrates a student's progress toward identified grade-level standards. Students develop 'performance portfolios' that are a collection of work demonstrating progress and achievement over the year.

Handheld Devices are technology instruments used to assist with fitness testing, grading, and class management. These devices help the physical educator collect and input information in the classroom or in an outdoor setting. Assessment data can be taken in the field then downloaded to a personal computer if needed. These pen-based and mobile (handheld) computing devices enable teachers to provide quick and efficient feedback on performance history to students in the playing field. The Sharp Wizard and Newton Message Pad are examples of handheld devices that deliver these types of capabilities.

Heart Rate Monitor (HRM)- A piece of technology used to gather heart rate data from an individual in exercise or at rest. The instrument comes in two pieces, one is worn as a wrist watch and the other is worn as a strap around the sternum, with an elastic band holding the instrument in place as the person exercises.

Historically Marginalized Groups- Historically marginalized groups would include women, bisexual, gay and lesbian individuals, American Indians, Blacks, Asians, Hispanics and all other nationalities and ethnic groups. Individuals are made to feel as though they are not the norm and are different and have little to contribute to society thus justifying their exclusion or denigration.

Methodological technology- is not normally considered a technology, although it is used to support specific learning competencies. An example of which would be a teacher who identifies learning competencies that are associated with higher level thinking gives students activities or games that require them to analyze and evaluate situations as opposed to recalling information.

Physical Education Listservs are e-mail lists that you can sign up for to receive messages that are sent to everyone signed up for that list. They exist for Physical Education professionals, USPE-L, sponsored by Virginia Technologic University, serves primarily K-12 teachers and teacher educators, it allows the Physical Education teachers to share ideas and communicate directly with one another. To find this listserv for Physical Education, visit pe.central.vt.edu/uspe.html.

Pedometer- A device used to count the number of steps a person takes during any designated time period. The instrument is worn on the person's hip and as the swinging motion from the hips takes place the pendulum inside the device swings and records the step. The instrument can also give an estimation on miles traveled and calories expended during the time worn.

Programming devices- Software that is used to create lesson plans, instructional materials such as assessment instruments, scoring rubrics and task cards. It is important to note that software tools not only support the development of instructional materials but also student learning.

Students with Exceptionalities- Students with Exceptionalities include high achieving students, low achieving students, students with physical and learning disabilities that may qualify for special education status and inclusion.

Technical tools- Computer run software such as word processors, spreadsheets, as well as the storage of student data and instructional materials.

Technology- The technical means people use to improve their surroundings. It is also a knowledge of using tools and machines to do tasks efficiently.

WASL- The WASL is a criterion based references test given to every 4th, 7th, and 10th graders in Washington state. WASL assessments require students to both select and create answers to demonstrate their knowledge, skills, and understanding in each of the Essential Academic Learning Requirements (EALRs)--from multiple-choice and short-answer questions to more extended responses, essays, and problem solving tasks.

ASSUMPTIONS

It is assumed that the guidelines and examples proposed to inform educators will assist them in addressing the Washington State Learning Goals, which were designed to raise academic standards and achievement of students.

ORGANIZATION OF THE PROJECT

The project is organized into six chapters. The first chapter contains an introduction, along with a purpose statement, significance and limitations of the study. The first chapter also houses the definition of terms, and the organization of the study. A review of literature is contained in Chapter II, and Chapter III describes the procedures that were used in the creation of this project. The final result of the project will be contained in Chapter IV, the summary, conclusion and recommendations are reported in Chapter V, while the Bibliography is housed in Chapter VI.

CHAPTER II

REVIEW OF LITERATURE

Current Status of Technology Use in Physical Education

As Means (2000) states “A dire need exists to provide a dynamic, convenient, robust, and reliable technology support structure for all educators and students.” Therefore it is of the utmost importance that teacher preparation programs equip preservice and inservice teachers with the requisite skills to design, analyze, synthesize and evaluate information while integrating instructional technology in support of learning. Unfortunately, the use of these technologies in schools remains sparse and instructionally conservative (Cuban, 2001). As the need for a technological support structure increases, Physical Educators must be mindful of how their students’ parents and guardians are getting most of their health information.

According to a recent Harris poll, about 98 million Americans now regularly get health information via the Internet (Sorensen, 2001). Physical educators have explored the use of technology in their discipline. The potential of the Internet has motivated many to implement the use of web technology to access resources and supplement instruction (Ellery, 1997).

Software programs are available that can track grading, student athletic performance and fitness, conduct health assessments and monitor in-class projects. Computer-assisted instruction (CAI) provides students with an alternative to classroom

type settings and enables the teacher to move around the teaching space and allows the computer to better do its job. Mohnsen (1995) identified a number of reasons for using CAI in Physical Education. One of the suggestions that Mohnsen provided was that CAI provides students with the “why” behind health-related fitness, and it provides unlimited practice, review and remediation. It also allows the students to stay actively involved and it meets a variety of students needs. Mohnsen also explained that when using the CAI a teacher can acquire a series of supporting software as well. An example of this might be the Physical Education teacher who was doing a unit on nutrition and caloric expenditure. The use of CAI-based eating habits and exercise survey would provide students and the instructor with information about the students nutritional and exercise habits, the CAI software could give data to the teacher for use later as a teaching or assessment tool.

A study done in Research Quarterly for Exercise and Sport, Mohnsen (2005) revealed that overall, students' technology competency improved significantly toward meeting national technology standards and proficiency in the use of selected instructional software applications after completing a course in technology. The purpose of this study was to examine the effects of integrating computer technology into a physical education course on student attitudes and competency levels toward national technology standards and selected instructional software applications. Also, students' attitudes toward national technology standards and selected instructional software applications were significantly more positive after their participation in this course. The students used various instructional software such as ADAM Interactive Anatomy, Adobe Photoshop,

Microsoft FrontPage, PowerPoint and video streaming software. Students published the lesson plans on the Internet where they shared with other students. Ninety-two percent of students indicated they would like to see more computer technology-integrated courses.

The study findings indicate that incorporating technology for teaching and learning across the curriculum can be effective in preparing teacher education students to effectively use technology as teaching tools when they become teachers.” Research Quarterly for Exercise and Sport (2005) A successful integration of technology into a Physical Education curriculum takes place when students and teachers can benefit from what technology has to offer. Such an example is in a Chicago public high school where weight training students can now workout with a computer system.

In Chicago’s Northwest Suburban High School, students now complete their workouts with help from a computer system. The FitLinxx system monitors students’ progress on weight machines and cardiovascular machines, gives instructions to speed up or slow down, and hands out compliments like "Good job!" The program keeps a tally of information-such as how much weight is being lifted, the number of repetitions, and the speed, which can be printed out for the teacher or the students. The information can also be stored on a web site for viewing by parents. This is the kind of technology that needs to be introduced to more middle and high school teachers across the country although it is pricey. The school district first tested the system in one school, Buffalo Grove High School, then a \$418,400 federal grant enabled it to install the system on eight cardiovascular and eight weight machines in each of its remaining five school fitness

centers, as well as to add it to 18 more cardiovascular machines at Buffalo Grove High.
(JOPERD Aug 2004)

Moving Towards Best Practices

Integrating technology into the physical education teacher education curriculum is becoming an increasingly accepted strategy for helping teacher candidates gain competence and confidence in using computer technologies in their teaching practices (Clift, Mullen, Levin, & Larson, 2001; Fiorentino, 2004).

Fejgin & Hanegby's (1999) study examines Physical Education teachers' patterns of in-service training in comparison to that of other teachers. The Physical Education teachers' level of satisfaction derived from their participation in the in-service training program was quite low. They generally responded that the in-service training programs that they received in the past did not contribute to their professional development. This study gives merit to the idea that teacher education programs currently do not meet the needs of Physical Education teachers. More work must be done to make the training they receive relevant to their subject area.

Technology education for teachers is also being studied around the globe. A study of schools in Israel was conducted in which 5,888 teachers were chosen. When an examination of the training patterns of the various groups was completed it showed that Physical Education teachers generally participate less than other teachers in the in-service training. None of the analysis that was conducted supported teacher satisfaction

from the program, and teaching Physical Education did not have an effect on satisfaction. Although satisfaction from the in-service program made quite a considerable mark on the teachers' attitudes towards the potential contributions of the training towards their future work and professional development. (Fejgin & Hanegby p. 4-16, 1999) "The findings suggest that school based in-service programs do not necessarily provide all the answers to the specific needs of different groups of teachers. It is recommended that policy makers in the educational system consider these needs more carefully."(Fejgin & Hanegby 1999)

A unique practice has been introduced to the world of fitness that is being utilized by Physical Education teachers nationwide. The practice that is propelling teachers towards better practice in their field, is the measure of the students heart rate. Measuring heart rates has been found to be a reliable, valid and objective means of measuring physical activity, although the instrument used to take the measurement is also subject to evaluation. Holligan (2001)

Leger and Thivierge (1988) stated that manual palpated pulse readings often are not accurate or reliable. Individuals in the past have relied on taking their pulse with the carotid (neck) or radial (wrist) arteries. Problems can arise. For example one may have a difficult time finding their pulse. Another is that once the carotid artery is found the vagal nerve is stimulated, this can decrease the heart rate. Leger and Thivierge have determined that the use of HRM's are valid and functional, especially those using an electric radio signal with a chest strap and wrist watch combination, such as used with the HRM sold today.

Uses of the HRM's to assist students comprehension of health related themes is an important factor as well as monitoring the students heart rate. Increased understanding of how the body reacts to exertion creates the opportunity for the student to participate in interdisciplinary activities and assignments.

Studying how the human body reacts to physical activity, Mohnsen (1999) suggested that the wearing of HRM's helps students to understand how their bodies react to physical activity, and can be worn during class to assist in student awareness of heart rate in relation to physical activity, stress, sedentary conditions and exertion levels.

The educational community has committed itself to the goal of integrating applied technology throughout teaching and learning environment including professional development. "The educational technology community has built on this consensus, articulating specific qualities that are important to creating professional development that moves beyond providing teachers with technical skills, and instead helps them to integrate technology into their curriculum and into their students' day-to-day classroom activity." (Anderson & Becker, 2001 ; Dede, 1998; Drazdowski, 1994; Office of Technology Assessment, 2000).

This literature also suggests that "teachers are more likely to build on what they learn from professional development experiences when their existing knowledge and priorities are acknowledged and made central to the learning process." (Cochran-Smith & Lytle, 1992; Lieberman, 1995).

A considerable level of agreement exists among researchers and policymakers in regards to the key ingredients that go into effective professional development programs for K-12 teachers. (Darling-Hammond, Lieberman, & McLoughlin, 1995). The National Staff Development Council's Professional Development Standards stresses the importance of features such as instructional strategies, assessment practices, aligning teachers' knowledge of content, and providing sustained blocks of time for training and follow-up support. The standards also stressed the idea of organizing teachers in learning communities. "Building on this research, many policy reports have also emphasized the importance of linking technology-focused professional development to teachers' immediate needs and interests, rather than simply delivering technical training on software independent of the curricular or instructional needs of participants" (CEO Forum on Education and Technology, 1999; Office of Technology Assessment, 1988, 1995).

Survey research conducted by Riel and Becker (2000) has demonstrated that teachers who regularly sought out professional development opportunities or who chose to lead such programs for their schools were far more likely than their colleagues to be competent and experienced users of educational technology. This suggests that these teachers have found relevant connections between educational technology and their own professional growth.

Studies such as those from Riel and Becker (2000) suggest that it is important to design professional development programs that encourage teachers to begin from their

own knowledge base, needs, and interests, instead of telling the teachers the reasons why they should jump on board with the administrations goals or ideas. "When teachers are mentally ready to engage with the ideas being presented, and when they can easily perceive a connection between those ideas and their own perspectives and goals, then they are likely to find the opportunity and motivation to follow up on what a particular professional development program may offer." Riel and Becker p.88 (2000). According to Kanaya, Light, and McMillan Culp p.109 (2005) "This study provides empirical evidence for the need to measure different levels of professional development outcomes regarding education technology integration (e.g., learning new technology skills vs. implementing new technology lessons), as well as for examining different combinations of programmatic and individual characteristics that may predict these outcomes." (Kanaya, T., Light, D., & McMillan Culp, K. P.109 2005)

Colleges of education have been accused of being slow in preparing teachers to use technology in teaching practice. Although inservice candidates can arrive with a wide range of beliefs, dispositions, skills and experiences, it is not uncommon for university courses to continue to teach isolated skills in the application of software alone. This practice leaves candidates with some basic technology skills but no current uses in the instruction of content areas (Grau, 1996). As a result, it is not surprising that teachers often do not transfer the information they learned into practice (Johnson, Gatz, & Hicks, 1997). There continue to be numerous barriers that impede the training, development and implementation process of technology infusion (Parker, 1996). A key barrier to

technology infusion is the role of teacher beliefs, which has been the focus of much research (Pajares, 1992; Richardson, 1996).

A need for professional development of teachers in the area of technology has been established. "Professional development is a key tool that keeps teachers abreast of current issues in education, helps them implement innovations, and refines their practice" (Cook and Fine 1996, p. 1). It is because the roles of career educators requires interpersonal skills such as cooperation, teamwork, communication, negotiation and professional development that inservice programs must allow educators time to learn the craft of technology and it's integration into the curriculum. Educators also need time to debate with their peers the various concepts and issues related to career development theories, teaching and learning strategies and technology use for career development.

Effective professional development cannot occur as a result of one-day workshops or single training sessions. It must be ongoing, designed with teacher input, foster critical reflection and meaningful collaboration, and allow for follow-up and support that is sustained over the long term. (Parker 1996)

Professional development can come in a variety of forms such as "mentoring, modeling, ongoing workshops, special courses, structured observations, and summer institutes" (Rodriguez and Knuth 2000, p. 4). It must provide opportunities for teachers to explore new roles, develop new instructional techniques, refine their practice and broaden themselves both as educators and as individuals. Beau Fly Jones contends that "effective professional development is necessary for all teachers involved in educational

reform" (Cook and Fine 1996, p. 3). It must enrich teaching and improve learning, support teacher development, be ongoing and long term, be job embedded and inquiry based, support current beliefs about teaching and learning, be clearly related to reform efforts, be modeled after learning experiences considered valuable for adults valuable for adults and support systemic change.

Opposing Views

According to author Todd Oppenheimer (2004) "When it comes to technology, too often educators think the more the better, the sooner the better." p.8 He argues that the current emphasis on technology use in schools drains resources from other subjects and prevents students from developing critical and creative thinking skills.

Oppenheimer claims that spending money on technology for schools is so heavy that the schools must eventually cut other programs to finance technology. How does spending money on computer equipment limit students' learning in other areas?

Oppenheimer says that "Those programs typically include physical education, music, art, shop classes, science laboratory materials -- all areas that have been proven to build much broader intellectual skills than computers do." p.56

Oppenheimer (2004) also states that "once a school has invested in computers, it's very difficult to keep the technology in its place as an occasional supplement. So much money and time and effort has gone into setting up the new systems that everyone immediately makes the technology a high priority -- much higher than it should be." p.33

Oppenheimer also warns that “computers tend to shift learning values from quality to quantity. In high-tech schools, what matters is the great amount of information suddenly available on a given subject on the Internet. What should matter is *how* students think about information, not the quantity of information sources.”p.39

The importance of showing an opposing view of technologies importance in the classroom is of the utmost importance. There are many who believe that Physical Education should rely on the virtues of low-tech education and Oppenheimer makes a point for the school districts to be wary consumers from those who wish to sell their new technologies. He advises that schools need to be absolutely certain that the new technology that they are going to buy is going to improve student learning.

Learning Benefits for Students and Teachers

The most valuable component of technology in Physical Education may be its ability to provide improved support for instruction, and the variety of programs and technology will continually grow.

A study conducted by Mitchell and McKethan (2003) states that “Physical education is a part of the total curriculum. Although physical education focuses primarily on teaching and learning in the psychomotor domain, it also contributes to the cognitive and affective domains of learning. Physical education has the potential as does any curriculum to contribute to student understanding of the culture, to transmit social values, and to meet the needs of individuals in order to create a better world. Adoption

of technology as a learning tool by physical educators advances the perception of physical education as an equal partner in the total curriculum, a partner that prepares children to live in a rapidly changing global community.” p.4-5

As a partner in the educational process and the integration of technology into education, Physical Education has the opportunity to change long held beliefs that it is not an academic subject. Many of today's adults remember Physical Education as dodgeball and running the mile. With a newly formed commitment to the total curriculum today's physical educators can raise a new generation that views Physical Education as an integral part in the educational process.

Mohnsen (2001), in the preface to *Using Technology in Physical Education*, 3rd Edition, tracks the definitions of educational technology. She defines technology as tools that help teachers become more efficient with their time and as an alternative way to provide instruction for students. For the purpose of this project, technology are the tools or devices used to create educational materials, to generate products of learning, to facilitate learning and to introduce greater efficiency in managing the educational environment. There are many technological tools that can integrate computer technology with Physical Education. Webquests are on the front line of providing teachers with the opportunity to enhance student learning with a non traditional teaching tool.

Despite some application requirements, webquests provide another means of integrating computer technology into physical education classes in order to enhance

student learning. Research in online learning shows that students can learn as effectively as in face-to-face instruction (Bennett & Green, 2001; GocKarp & Woods, 2003)

The main goal for the future of technology is for it to become an essential part of the learning process. By integrating video production into the curriculum, for example, students can be introduced to a creative form of knowledge construction. Without the example of this technology, many teachers would not have been willing to use these sort of methods within their teaching practices.

Physical education teachers are in a position where they can implement the use of technology in their classes in order to make instruction more effective and make student learning more relevant. Evidence shows that the use of technology as an instructional tool in Physical Education can be beneficial to both students and teachers. Technology can enable teachers to create more developmentally appropriate environments for their students as well as promote more student autonomy during skill and fitness learning. Research on the use of computer technology in K-12 institutions indicates there are many positive educational benefits for students (LaMaster, Willams, & Knop, 1998). Computer technology can be an effective tool to increase teacher effectiveness, and we know from best practices information that increased teacher effectiveness will result in greater student learning (Zemelman, Daniels, & Hyde, 1998). Effective teaching procedures can enhance learning, and effective use of technology in a school setting can help students attain greater understanding of theories and principles (Brayley, 1999).

Another example for why teachers need guidance on how to integrate technology into their curriculum is from Wilkinson, Pennington and Padfield (2000), who suggest that incorporating computer use into physical education classes can help enhance and maintain students' interest in learning. DeiTufu (2000) found that benefits of using the Internet included: making students part of a global community, offering more access to resources, stimulating critical thinking, increasing general computer literacy and heightening teacher enthusiasm. This study symbolized the scope of computer technology, in that it could be used in a variety of ways to accomplish the goals of education. Using internet assessment tools for health related fitness allows students to interact with the content and apply their knowledge to authentic tasks. There are computer-based programs that emphasize individual skills and fitness and identify students' developmental stages. These innovations assist students in making cognitive connections between physical activity and diet. While being monitored by a certified physical educator, web-based tools can be implemented for effective use by students to identify health-related areas of concern (Holligan, 2001).

A study done by Cradler's (1992) observed that outcomes will be positive when the effective physical educator uses the appropriate technology with sound pedagogical strategies and applicable content in their curriculum. When shown how to integrate technology into their curriculum, teachers can become effective communicators of fitness strategies to their students through the use of technology.

Technology Meets Constructivism

Public schools have and will continue to reflect our societal changes and there is an extremely strong link between effective use of modern technology and the theory of constructivism. In today's schools a new wave of technology is beginning to affect change that will forever alter how students learn in the classroom. John Dewey advocated constructivist practice at the turn of the century and Maria Montessori and Jerome Bruner based their educational models on constructivism, and more recently, Vygotsky (Collins, 1991). Constructivism as a theory of learning is similar to behavioral theory. Constructivism is centered around the child; it "proposes that learning environments should support multiple perspectives or interpretations of reality, knowledge construction, context-rich, experience-based activities" (Jonassen, 1991, p. 28). Constructivism focuses on knowledge construction, not knowledge reproduction.

It is imperative that the student of today learns how to be an information manager, rather than an information regurgitator. (Mann, 1994). In a technology-rich environment one must remember that the educational focus is on learning and instructional goals instead of the technology itself, because technology is merely tools or avenues for delivering instruction (Campoy, 1992). It is not what equipment is used, but how the equipment is used which makes it relevant to a constructivist classroom (Strommen and Lincoln, 1992).

Studies show that in technology rich classrooms there are many observable changes:

- There is a shift from whole class to small group instruction.
- Coaching occurs rather than lecture and recitation.
- Teachers work with weaker students more often rather than focusing attention on brighter students as in traditional settings.
- Students are more actively engaged.
- Students become more cooperative and less competitive.
- Students learn different things instead of all students learning the same thing.
- There is an integration of both visual and verbal thinking instead of the primacy of verbal thinking (Collins, 1991).

According to a study conducted by Dwyer, et. Al, (1991), student self-esteem and motivation in a technology-rich environment was measured and found to be strong.

Fruther, student attendance was found to increase and discipline problems were reduced. Students were also coming in on their own time during lunch, recess and after school to work on their projects. Students shifted from being competitive to collaborating on projects.

With the combination of technology use and constructivism students and teachers can improve upon a great many things in their classrooms. Physical Education teachers in particular might find that technology use within their classes brings about the above

mentioned changes and encourages students to be creative free thinkers when it comes to their health and fitness identity.

Collins (1991) states, "So, inadvertently, technology seems to be coming down on the side of constructivists, who have been trying--unsuccessfully to date--to change the prevailing societal view of education" (p. 31). Why is this the case? When computers and other Physical Education technologies are used they undermine the lecture methodology, and instead promote the student as a self-directed learner. "And just as a change in practices with respect to racial integration led eventually to a change in racial attitudes, so a change in practices will slowly lead to a change in the educational beliefs of society. Using computers entails active learning, and this change in practice will eventually foster a shift in society's beliefs toward a more constructivist view of education" (Collins, 1991, p. 33).

According to Mann (1994), the use of new technologies in an educational setting has caused the theory of learning, constructivism, to receive new attention. Students in these settings become empowered by gaining access to real data and work on authentic problems. Often, roles are reversed as teacher and student learn from one another.

Issues for Teachers

In a study examining what hinders or promotes successful integration of technology into the middle-school curriculum, Persky (1990) noted that using technology is not easy and that learning how to effectively use technology in the environment of the classroom does not happen overnight. The need to allow time for continual learning is

repeated in studies outside of education, which suggest that providing workers with high quality technology on the job eventually fails if employees don't receive adequate training and on-the-job support (Moursund, 1992).

This need for continuing support means teacher training must be ongoing and not limited to "one-shot" sessions (Hawkins & MacMillan, 1993; Kinnaman, 1990; Shelton & Jones, 1996). Harvey and Purnell (1995) stated that teachers want continued staff development rather than short-term training and development programs in technology.

With increasing technology standards developed by the National Council for Accreditation of Teacher Education (NCATE) and the International Society Technology Education (ISTE), it is of the utmost importance that teacher education programs incorporate computer technology and Internet resources for teaching and learning across the curriculum.

Teachers have their own list of standards with which to meet when it comes to technology. National Educational Technology Standards for Teachers.

The list includes:

I. Technology operations and concepts: teachers demonstrate a sound understanding of technology operations and concepts.

II. Planning and designing learning environments and experiences: Teachers plan and design effective learning environments and experiences supported by technology.

III. Teaching, learning and the curriculum: Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.

IV. Assessment and evaluation: Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.

V. Productivity and professional practice: Teachers use technology to enhance their productivity and professional practice.

VI. Social, ethical, legal, and human issues: Teachers understand the social, ethical, legal and human issues surrounding the use of technology in PK-12 schools and apply that understanding in practice.

With the long list of standards that teachers must meet it is evident that Physical Education teachers must also get heavily involved in the implementation of technology into their curricula. The congressional Office of Technology Assessment has reported that helping teachers "effectively incorporate technology into the teaching and learning process is one of the most important steps the nation can take to make the most of past and continuing investment in educational technology" (U.S. Congress, 1995, p. 8).

Classroom teachers understand that effective teaching in the modern era demands the integration of technology into their teaching. In response to this demand, teacher education programs have begun to offer a variety of training options to prepare teacher candidates to do so. As long ago as 1989, (Bitter, 1989) "Colleges of Education must have program requirements to insure adequate preparation for students to use computers as a tool in their teaching" (p. 34)

The National Educational Technology Standards for Students states: "Technology must be incorporated into the educational environment as both a tool for learning and as a resource in that teachers are to prepare students to successfully meet the challenges of the future. Students must be able to select appropriate technological tools that allow them to obtain, analyze, and synthesize information in order to make informed decisions and meet curriculum standards."

It has been suggested that educators could best use technology within a "framework for technology-based teaching and learning that focuses on engagement" (Goddard, 2002, p. 23). Engagement in this form means that students will in a meaningful way participate in a variety of learning activities within a supportive learning school environment that is centered around the student and involves active and cooperative learning.

Because teachers vary in their level of expertise at the time of their training, the context which surrounds their technological professional development must provide a non-threatening environment that is sensitive to the individual teacher's level of expertise and experience (Browne & Ritchie, 1991; Shelton & Jones, 1996).

As a result, Stager (1995), Browne and Ritchie (1991), and Persky (1990) all suggest that collaborative problem solving and cooperative learning must strengthen the approach to technology learning for teachers. Even though a variety of collaborative learning approaches are available, peer coaching and modeling have been most effective in transforming workshop information to classroom application and practice (Browne & Ritchie, 1991; Kinnaman, 1990; Persky, 1990).

CHAPTER III

PROCEDURES

Genesis of the Project

While serving a year long internship at Thorp Schools in Thorp, Washington the author took notice of emerging technologies in the Physical Education field. Noted by the author was the amount of preparation that was needed to implement Physical Education technology into the current curriculum. After working with the cooperating teacher for an entire school year and observing the amount of preparation time needed in the use of Physical Education technologies, it became obvious to the author that many Physical Education teachers resisted taking on new technologies and wanted to stick with their traditional ways of instructing their classes. It was at this point that the seeds for a Masters Project were planted.

The purpose of this project is to develop a guide and tools to be used to organize and assist current Physical Education teachers during the process of implementing technology into their current teaching practices.

Project Development

A systematic review of literature relating to Physical Education technology and instructor attitudes was conducted using a variety of databases. These included but are not limited to Eric, PsycInfo and Article First. From this search a total of sixty two related books, journal articles and web postings were collected. The information within these sources was organized according to categories; current status of technology use in

physical education, moving towards best practices, opposing views, learning benefits for students and teachers, technology meets constructivism, and issues for teachers. These six categories generated the sub-headings appearing in Chapter II.

During the review of literature a number of issues came to the attention of the author including, the attitudes of current Physical Education teachers towards the use of technology in their field. Some Physical Education teachers are hesitant to step forward and stake their claim on technology money that is available in their school. There is, however, a pioneering group who do embrace this new age of Physical Education and it's emerging technologies.

Project Implementation

This guide has been designed with those educators who resist technology in mind, but will naturally appeal to those who wish to embrace new technology whenever possible. It is a thorough, step by step process, through which Physical Education technology can be added to any school environment. With the help of basic technological support that is available in every school of this era, all Physical Education instructors will be able to benefit from the many new tools that will make a significant difference in the lives of their students.

There is also a need for Physical Education technology training for the instructors of this subject. Many Physical Education teachers who have technology available to them have the tools but not the training to use their equipment. This technology is not being utilized fully if the teachers are not shown how to use their new technology in a way that improves student learning and aids in lesson planning and development.

The author studied the current research, theories, and literature surrounding Physical Education and its connection to past, current and emerging technologies. The author also studied constructivism and its role within the use of new technologies in Physical Education. Additional topics that were studied and included in the project were the issues of students from historically marginalized groups, lower socio-economic status, high achieving students, low achieving students, students with physical exceptionalities and special education students. The project explores equal access for these students and how they can achieve equity in their access to all Physical Education technologies that are available within the school.

After conducting this research, the author ultimately decided to use the information that was relevant to the project from the above mentioned topics to create the guide and tools contained within this project. The review of literature contained within this project was conducted at Central Washington University. Many resources were used to compile this review of literature including online databases, professional journals, books, websites, magazines and textbooks.

The guide and tools contained within were designed to assist current school personnel and Physical Education teachers on the implementation of technology into their current curriculum. It is not to be taken as is and applied to any specific school. It is meant to be altered to fit the unique circumstances of the school in which the followers of this guide are working. This guide was designed to improve student learning and Physical Education teacher efficiency in the classroom.

CHAPTER IV
IMBEDDING NEW TECHNOLOGIES INTO CURRENT PRACTICE:
A GUIDE FOR PHYSICAL EDUCATION TEACHERS

INTRODUCTION

The guide contained in the following pages is designed as a stand-alone document to be used by professionals in the field.

This project will remind the readers that people from historically marginalized groups, lower socio-economic status, high achieving students, low achieving students, students with physical exceptionalities and special education students will be included in the Physical Education technology integration guidelines. Questions will be raised to remind the followers of this guide, that these students are not to be forgotten and that they will be helped if the suggestions of this guide are followed. The guide does not however forget the needs of the average student, the guide takes into account the special needs of every individual student.

The guide contained within is meant to be used as a blueprint to help those who wish to implement a Physical Education technology plan into their school. The reader should try to make this document fit their individual school, because after all every school district, and Physical Education program is unique. The focus is to help those implementing the plan to organize the Physical Education teachers and staff who are going to be working with the technology. This project is not a specific lesson plan that should be taken, reproduced and handed out to other Physical Education teachers. It is a

launching pad for critical thinking about each educator's specific program, and must implement considerations of community, school district, faculty and student uniqueness.

Once you have considered the answers to the questions that are raised in this project, there will be tables of implementation for you to follow to integrate technology into your Physical Education program. Do not get overwhelmed by the scope of the project, there will be step-by-step instructions on how to implement new technologies into your program.

Examples of popular Physical Education technologies were discussed in the review of literature in Chapter II and will be revisited in this portion of the project as well. It is important for the reader to be able to define current technology so that they can better understand how it applies to this guide.

Computer-Assisted Instruction- is a narrower term and most often refers to drill-and-practice, tutorial or simulation activities offered either by themselves or as supplements to traditional, teacher directed instruction.

Didactic tools- A broad range of objects including educational television, assistive technology, and simulation games.

Electronic portfolio- Uses electronic technologies, allowing the portfolio developer to collect and organize portfolio artifacts in many media types (audio, video, graphics, text). Electronic portfolios are used to help students create personal practice plans, develop fitness and wellness programs, and compile demonstrations of their learning over time. These portfolios provide a collection of work that demonstrates a student's progress toward identified grade-level standards. Students develop

'performance portfolios' that are a collection of work demonstrating progress and achievement over the year.

Handheld Devices are technology instruments used to assist with fitness testing, grading, and class management. These devices help the physical educator collect and input information in the classroom or in an outdoor setting. Assessment data can be taken in the field then downloaded to a personal computer if needed. These pen-based and mobile (handheld) computing devices enable teachers to provide quick and efficient feedback on performance history to students in the playing field. The Sharp Wizard and Newton Message Pad are examples of handheld devices that deliver these types of capabilities.

Heart Rate Monitor (HRM)- A piece of technology used to gather heart rate data from an individual in exercise or at rest. The instrument comes in two pieces, one is worn as a wrist watch and the other is worn as a strap around the sternum, with an elastic band holding the instrument in place as the person exercises.

Methodological technology- is not normally considered a technology, although it is used to support specific learning competencies. An example of which would be a teacher who identifies learning competencies that are associated with higher level thinking gives students activities or games that require them to analyze and evaluate situations as opposed to recalling information.

Physical Education Listservs are e-mail lists that you can sign up for to receive messages that are sent to everyone signed up for that list. They exist for Physical

Education professionals, USPE-L, sponsored by Virginia Technologic University, serves primarily K-12 teachers and teacher educators, it allows the Physical Education teachers to share ideas and communicate directly with one another. To find this listserv for Physical Education, visit pe.central.vt.edu/uspe.html.

Pedometer- A device used to count the number of steps a person takes during any designated time period. The instrument is worn on the person's hip and as the swinging motion from the hips takes place the pendulum inside the device swings and records the step. The instrument can also give an estimation on miles traveled and calories expended during the time worn.

Programming devices- Software that is used to create lesson plans, instructional materials such as assessment instruments, scoring rubrics and task cards. It is important to note that software tools not only support the development of instructional materials but also student learning.

Technical tools- Computer run software such as word processors, spreadsheets, as well as the storage of student data and instructional materials.

Goals for Physical Education teachers while using technology:

- Learning the basics of using P.E. technology
- Using technology to support instruction
- Integrating new technology into classroom practice

- Discovering new uses for technology tools or designing projects that combine multiple technologies.
- Focusing on cooperative, project-based and interdisciplinary work with technology being just one of many tools that students use.

Professional Development Activities

New career development theories have implications for how career Physical Educators approach teaching and learning. Professional development activities may enable teachers to broaden and expand their expertise in performing their new roles and connecting education, work, and career. Some strategies for the professional development of teachers include the following:

- * Professional development as a continuous improvement process
- * Worksite experience
- * Workshops and conferences
- * Use of teacher networks
- * Collaboration with teacher unions

Such professional development strategies should go beyond learning new skills, and should include formal and informal ways to help teachers develop new insights into practice and new approaches to technology education.

Expectations

By the conclusion of their programs, each teacher should be expected to demonstrate knowledge, skills, and experience in using digital technology by:

1. **Accessing and using information:** Locate, access, organize, store, retrieve, critically analyze, and use various kinds of information from a variety of sources.
2. **Creating solutions and original products:** Work individually and in groups to identify, define, analyze, and solve problems, make decisions, and create original products, articulating his or her reasons for the choices and decisions he or she has made.
3. **Communicating:** Effectively communicate information and ideas to various audiences, for a variety of purposes, using a variety of written, oral, and visual means that are appropriate to the purposes and audiences addressed.
4. **Reflecting on professional growth and practice:** Document, reflect on, and articulate understandings of what he or she has learned about teaching and about appropriate uses of instructional technology. Identify opportunities and set goals for the continuous development of his or her knowledge and skills as a teacher, both in general and with respect to his or her use of technology.
5. **Instruction:** In at least one of the preceding four domains, each teacher will demonstrate the ability to make effective use of digital technologies in one of his or her teaching field placements. (Teachers will periodically discuss and analyze their efforts to meet this standard in the seminars associated with their field placements.) In satisfying

this last standard, each teacher will justify why he or she has used particular instructional technologies (and why he or she has used technology at all) in his or her lesson(s), and will provide evidence of (1) effective mobilization and equitable use of technology resources, (2) active engagement of all students, including those with different learning styles, disabilities or other challenges to learning, and (3) the student learning that resulted from his or her lesson(s).

National Board for Professional Teaching Standards. (n.d.)

Development of a Successful Physical Education Technology Training Program

Developing a successful Physical Education teacher technology training program requires more than turning the faculty loose after conducting a few workshops. Appropriate technology training for teachers can be expensive, in terms of both time and money spent on technology equipment. School districts must do a better job of allocating resources for Physical Education professional development as opposed to putting all the budget into technology acquisition. Schools will be left with the tools, but not the training to teach the teachers how to utilize the tools. How can you build faculty support and enthusiasm for technology and technology training? Here are some strategies.

1. Turn the Physical Education teachers on to technology.

If you think all teachers will be thrilled about getting a computer for their gym or classroom, think again. To the undertrained, technology can often be a source of anxiety. That's why, before attempting any technology training, you must first get teachers excited

about the prospect of using the new technology and the corresponding software and hardware. The idea is to show the teachers how to use the software applications, and how they are beneficial to their classroom and ultimately to student learning. The power of the first impression is huge, particularly with regard to new technology. Even the teachers that are the most resistant to technology can see the benefit to their class and to student learning. Unlike other forms of staff development, technology training for teachers has to be hands-on from the very start.

Before the technology introduction begins be sure the technology equipment is tested and configured and is available for use and practice. The technology you intend to use in the classroom must be present in your building and functioning reliably. Otherwise the training will only lead to frustration. A sample introduction to the basic technology lesson is included in this project, entitled "Learning the basics of using P.E. technology."P.100

2. Start at the beginning.

Just like students, teachers learn at different rates and have specific needs when it comes to acquiring new information and mastering new skills. That means teacher technology training should be flexible, yet cover a comprehensive set of skills.

As soon as possible, encourage the teachers to experiment with the technology in their daily lessons. This will hopefully pique their interest in the technology and should allow them to feel personally connected to their new equipment. Beyond this, advise them to allow their students to explore with them, and where possible, to have their students explore on their own.

In fact, teachers will quite often learn more about a particular software application by watching students interact with it and observing how they solve problems. Typically, students are not intimidated by computer glitches and can demonstrate the troubleshooting process to teachers.

3. Allow for plenty of time.

Technology training takes a great deal of time, and for adults the learning curve for developing technology skills is like learning a new language, and at times can become quite frustrating.

Having learned the basics, teachers need roughly six months or more to practice their skills and, more important, to learn problem-solving strategies for those moments when the various technologies don't work properly. When this occurs many teachers may become tempted to give up on the new technology, convinced they'll never truly become proficient. Personal help with district technical staff is the best way for teachers to become confident about troubleshooting the technology difficulties they come across. An idea for making this a manageable proposition is to enlist the help of computer literate teachers to provide help and guidance to those that need help understanding their new technology.

The key is to assign enough one-on-one instructional assistance in each building to allow teachers to begin asking questions and therefore become much more familiar with their new technological tools. If the teachers do not have the chance to peer

scaffold, then many teachers will simply accept that a particular software application or technological tool is not going to work for them.

Peer scaffolding is crucial for getting past reluctance or fear. Watching computer veterans find solutions to technology tools and then practicing the problem-solving techniques under the veterans' guidance, also helps teachers make the connection between their technology training and real-world problems.

It might be useful to help teachers develop their own personal plans for technology growth during this period. By putting individual goals in writing, these plans formalize teachers' commitment to using technology in their everyday classes. The plans should specify the technology outcomes to be achieved such as specific projects with students and should list technology tools to be mastered by a certain date.

The plans should require teachers to demonstrate computer skills during regular classroom observations by administrators. The plans should also identify key areas of a teacher's day-to-day lessons in which technology can be used effectively, taking into account each teacher's current skill level.

4. Offer a reward.

It is a smart idea to try to free up some extra funds to buy the teachers time. Long term professional development in technology demands a greater than usual commitment on the part of individual teachers, who will need to work many hours above normal district requirements. It's only fair to compensate them for this extra effort.

Another important step is to get teachers to identify the technology applications they need in their own classrooms, encourage them to attend outside workshops and provide them with support to integrate specific computer applications into their daily lessons. Continue to offer ongoing troubleshooting assistance to even the most advanced teachers, but let them take the lead in solving problems while they are receiving technical advice.

5. Offer Consequences

If after a year or more of intensive training and support in technology, some teachers continue to resist using technology in their classrooms, taking the technology away from those instructors may be your only option. The alternative is to waste a valuable resource that could be put to good use elsewhere. Removing the teacher's technology altogether, might be the only way to get through to this teacher. If that is what the teacher wants, then this is a tough decision to make. It may not be long before that same teacher requests that you return the equipment and shows a new and improved attitude toward integrating technology into daily lessons. Education Development Center. (1999)

Seven Components for Successful Physical Education Technology Integration

1. Community Support

A technology implementation program can only take off and flourish when everyone involved with the school believes and supports the project. The principal, parents, students, school board members and the school district all must be on board. The school district must allow time for and other teachers involved to have the appropriate release times and training necessary for implementing technology into the current curriculum.

2. Leadership Through Respect and Encouragement

Those involved in the process should show leadership skills that allow for free thinking as well as working with others within the group. The teachers cannot be told what to do with the rigid tones of a dictator. The teacher's ideas must be valued because it is their creative thinking that is going to allow the implementation of technology into the school's curriculum to truly flourish. The most effective type of leadership occurs when the teachers can be lead through quality communication, respect and encouragement.

3. Practicing Teachers as Technical Support

Technical Support within the school that is both cost effective and of high quality is a difficult combination to achieve. By using teachers that are trained in the technology that is going to be implemented into the program, the school can save large amounts of money by not having to pay outsiders for technical support. By training teachers that are

involved in Physical Education, as well as those from other subjects, the school will also allow the program to put its roots deep within the school. The teachers that are trained in the technology should be quite proficient so that many of the troubleshooting concerns that arise can be met without outside help. Teachers are perfect for the job of on site technical support because they know how to work with other teachers, and they can keep the needs of the school in mind while they are troubleshooting. The current teachers have experience working with students and teachers, and they can work well with those teachers that may be a bit timid when it comes to technology use.

4. Physical Education teachers must have first opportunity.

When new technology arrives in the school the Physical Education teachers should be the first to receive the new technology, and the first to be trained on how to use it and troubleshoot it. It is important that the teachers feel comfortable with the equipment and get the most time with the technology. By receiving the equipment first, the teachers will be allowed the most time to work with the equipment and hopefully begin to scaffold one another through the intricacies of the technologies use. Physical Education teachers, and teachers in general, are the leaders of their classrooms. They can also take the leadership role within the teaching staff when it comes to teaching one another. Adequate time and training needs to be devoted to helping the teachers learn how to most effectively use their newly acquired technology. Milken Exchange on Educational Technology. (1999)

5. Communication between Physical Educators and the Community

In order for anything that happens at school to succeed the parents and community must be involved. Successful technology integration cannot occur without support from the school, parents and the community. It is best to arrange some way in which the community can become aware of what you are trying to accomplish. If this is done, members of the community can offer help and support. Curriculum is an evolutionary process and it will change forever, granted that we as educators do not become stuck in old and outdated ways of educating. Effective and efficient communication between educators, the school and the rest of the community is essential for any technology integration to occur.

6. Evolution of Training

The idea that as soon as technology is completely integrated into the Physical Education program, that the technology will by then be obsolete, is not an uncommon thought. Technology as well as any other teaching tool changes at an unbelievable rate. In order for the technology program within Physical Education to be complete, the school must commit itself to a continuing effort to update equipment and provide the involved teachers and support staff with training to match the changing equipment and technology.

7. Restructuring and Cohesion

It takes time for teachers to update their curriculum to match the needs of their new technology. It is vital that teachers around the school who are involved, take the time to update their curriculum and work together. A cohesive team of people working together to improve student learning through the use of their new technology will be the result.

Physical Education Technology Development Program

A successful professional development program for Physical Education teachers in technology focuses on skill-building and gives teachers incentives to devote the time and energy needed to use new technologies. This type of program provides:

1. Intensive training in which teachers explore new ideas and materials over several sessions.
2. Follow-up consultation with mentors over an extended time period as teachers implement new practices.
3. Ongoing reflective conversation with colleagues doing the same job and implementing similar technology applications.
4. Observation of other teachers using exemplary techniques for incorporating technology in the classroom.

Bell, R. & Ramirez, R. (1997).

Training Groups of Physical Education Teachers with Different Skill Levels

When training with a group of Physical Education teachers the following procedures should be followed when dealing with different skill levels. The following section is divided up into three distinct sections for teachers with differing levels of skill with computer technology. Learning to better use basic technologies such as word processors and other basic components of a computer are essential to using the technologies that are available in the schools. Many of the technologies available now come with related computer software and lacking the ability to properly run the software would be a great hindrance to the teacher and the program. Also included are two sections entitled Best Practices in Technology Training and Examples of best practices.

1. Group training: Basic sequence

General computer operations: Definitions and descriptions of various hardware components, such as motherboards, processors, hard drives, floppy drives, RAM memory, CD-ROMs, video cards, sound cards, Ethernet cards, and other peripheral devices; introduction to basic, Windows operations, and Mac operations; file saving and retrieval; network logon procedures; and use of mouse.

Operating systems training: The most commonly used features of Windows and Mac operating systems, such as the configuration of desktop screens, background colors, icons, shortcuts, screen savers, file management options, program groups and subgroups, software installation, virus protection, disk scan, CD-ROM applications, recycle and

trash bins, control panel options, startup program options, program properties and adjustments, use of clipboard and notepad features, and security options.

2. Group training: Intermediate sequence

Telecommunications training: A detailed overview of local-area network (LAN) operations and the Internet, such as server access, file-transfer procedures, printer-selection options, e-mail and attachments, Internet browsing and search strategies, bookmarking of web sites, Internet security issues, bulletin board services, discussion groups, and chat lines.

Computer applications training: A concentrated block of training in word processing, including WordPerfect, Microsoft Word, graphics application training in presentation-tool training in Microsoft Powerpoint; database training in FrontPage and Hotdog (web-authoring tools), Photoshop and Quicktime.

3. Individual training and support: Advanced sequence

Classroom-specific applications: Physical Education teacher-specific instructional tutoring in a variety of educational software packages and Internet web sites covering the full range of age and grade levels. Members of the technology support staff evaluate Physical Education teachers' needs, interests, and skill levels and try to match these variables to specific software titles, Internet projects. Each teacher is provided a budget for new software acquisition for titles not found in the school's existing software library.

This portion of each teacher's technology training is intensively hands-on and conducted one-on-one with support staff.

Workshops and seminars: Teacher-specific enrollment in out-of-district technology workshops, seminars, and courses designed to enhance foundation skills and explore application software more thoroughly. Emphasis is on articulating technology competencies directly into daily lesson plans. Release time is given to teachers to take advantage of instructional opportunities offered by nationally recognized experts in such areas as engaged learning and problem-based learning methodologies, the constructivist approach to instruction, portfolio assessment, and authentic education strategies.

Consultation and support: Teacher-specific assistance in the planning and implementation of engaged learning and problem-based learning strategies for lesson plan development. One-on-one support from the district technology staff is provided to teachers as they integrate technology into their daily instructional activities.

Collaborative teaching methods and mentoring are used extensively.

Independent study and curriculum development: Specific activities must be detailed in each faculty member's individualized technology growth plan. Teachers are required to conduct independent research on a topic or teaching method using technology. Release time, additional planning time, and/or monetary rewards are granted to teachers involved in the development and publication of new curriculum components or computer-assisted instructional methods that contribute to the knowledge base in technology in education.

Troubleshooting instruction and support: Day-to-day support to teachers for solving various glitches encountered with both hardware and software. Emphasis at this phase is on encouraging teachers to become comfortable enough with their equipment to begin to solve problems on their own through advice and assistance. The goal is to demonstrate that teachers can get past specific problems when computer hardware or software isn't performing as planned. Brand, G. A. (1997)

Best practices in technology training

Mandates and incentives are dominant themes in establishing successful professional development practices, other examples of the kinds of incentives schools and districts commonly use to encourage staff development participation are stipends, in-service credits, and certificate renewal credits.

Examples of best practices include the following:

- Mandating teachers to use classroom-management software as a way to get reluctant teachers more involved in technology.
- Requiring teachers to earn in-service credits for technology training or lose their jobs.
- Providing monetary incentives for teachers who are willing to take technology training and then train other teachers.
- Offering peer-based training by paying teachers to deliver workshops on a particular piece of software or application that they have become expert in.

-Rewarding teachers who receive training with free hardware and software or offering interest-free financing to teachers who want to purchase a computer for their homes.

-Allowing teachers an opportunity to take school laptop computers with CD-ROMs home for practice.

-Allowing teachers to take their classroom computers home for the summer, provided they return them when school is back in session.

-Requiring teachers who are interested in receiving a free Internet account for personal use to attend an eight-hour weekend training session before getting browser software and access to the Internet.

-Paying teachers an additional \$50 stipend per day for any technology workshops they attend, with a limit of three per year.

Physical Education Technology Integration Plan

Determining how technology will be used to support teaching and learning should be the first step in the improvement of curriculum.

An educational technology plan outlines how technology can assist in achieving the goal of improving student achievement and preparing students for life and the workplace. The next step should be to examine the current district efforts in meeting the academic content standards and the goals statements included in the school district's improvement plan. The planning team should next observe the many uses of technology and develop its own vision for how technology can support the goals of the district and their continuing effort to help students meet the academic standards of the state, school and the Physical Education program.

The next step should be to establish how technology is currently being used in the school. The steps to follow should not only depend on the objective of the school but the current use of technology and the school's available resources. Outline the steps to move the school from its current state to the future of technology use in the Physical Education program.

Constantly revising the work is a must, planning to implement technology into the program is an ongoing process and should have checkpoints to reevaluate its effectiveness along the way. Technology is changing at an incredible pace and in order to stay current, constant revisions of the work you are doing is going to be necessary to stay on top of the program.

What follows are ideas for elevating the standards-based curriculum in Physical Education through the use of various technologies.

- Communication between the school and home such as e-mail, class web pages, electronic grade book.
- Heart rate monitors and pedometers for use in objective grading as well as cross-curricular activities.
- Electronic attendance and other student record keeping tasks.
- Community access to technology resources to increase interest at home.
- Parental and student access at home to learning resources in a variety of different languages.
- Electronic body composition scales for use in tracking student progress towards fitness goals and for teaching about healthy muscle to fat ratios in the body.
- Increased hands on practice time with the technology tools.
- In class activities that are designed to permit teamwork, and allow students to connect in cooperative projects with their classmates and with students from around the country or worldwide.
- Virtual field trips to places relevant to the subject areas of Physical and Health Education.
- Bio-feedback machine to practice relaxation techniques.
- Electronic grade books, which parents have access to at home.

- Digital photography and video analysis of motorskill development.
 - Physical Education learning resources available electronically throughout the entire school. Kuperstein, J., Gentile, C., & Zwier, J. (1999)
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Suggested Actions and Guiding Questions

The follow section is divided up into 5 distinct sections. Each raises questions and makes points about how a technology integration plan for Physical Education should progress and evolve. By taking into consideration the questions, the reader should be able to create a program that best suites their needs from Physical Education technologies. The following sections also identify specific ideas and issues that should be addressed under each component of the plan. The suggestions precede the questions which explore the step in depth.

Part I. Curriculum

Needs and Resource Assessment

First assess the availability of the technology to meet the individual needs of teachers and students both before and after school.

- Is technology currently available to all students, even those who are not currently enrolled in Physical Education classes?
- Are all the different groups of students making balanced use of the available technology?
- Are students from historically marginalized groups, lower socio-economic status, high achieving students, low achieving students, students with physical exceptionalities and special education students all being allowed equal access to the technologies? For instance, is the technology used by all the students in the

school as a tool to promote learning or is it accessible only to a specific few groups of students?

- Is the technology available to those in either advanced or Special Education programs or on a first come first serve type basis? Is any of the technology available for reservation?
- Is technology available to students after-school hours? Do students have access to technology at home, or at their local libraries or community centers?
- Does access differ for different subgroups of students? If this is the case what groups of students have limited access, and which students have more access?
- Do students and those that are not Physical Education students have access to appropriate technologies to support their learning? For instance, are assistive technologies available to students who have special needs as well as to the other students, such as students who have physical disabilities and who might still benefit from the use of these devices and software?

Assess the school's current use of technologies and other technologies to support teachers and student learning?

- How is technology being used and how is it being used at each grade level?
- Is technology being used to provide powerful learning opportunities for students and especially those students with special needs and those of low Socio-Economic Status?

- Has the school established levels of proficiency for grade levels? If so, are these proficiencies integrated into the Physical Education curriculum and the school wide curriculum?
- Is technology currently being used by teachers and administrators to promote classroom and school wide management?
- Is technology being used to promote communication between the home and the school?
- Do the parents and guardians need education and training in order to make communication between home and school possible by using technology?

Review the school's goals as presented in your school wide curriculum plan.

- What are the school's Physical Education curriculum goals and how do they help students pass the WASL High School exit examination?
- Are the goals that the school and the district have set out to help the students pass the WASL showing any positive results?

Goals

Develop clear goals and a specific plan for implementing technology into the curriculum and for improving student learning and teacher proficiency in using the technology.

- For each grade level, how can technology be used to help students meet or exceed their grade level expectations?
- How will technology be used to create more powerful learning experiences and meet the needs of all types of students, including those with exceptionalities and

those from low Socio-Economic status and those from historically marginalized groups?

- How will teachers from all grade levels of students (K-12) work together to use technology to support the needs of all students?
- When will all of the proposed strategies for the use and integration of technology be employed?

Develop clear goals and a specific implementation plan that describes how and when students will acquire technological skills needed to succeed with the new technology equipment.

- How will the plan address technology proficiencies skills?
- How will elementary, middle and high school teachers work together to make sure that the students retain the information and skills that come along with working with the technologies?
- Will graduation from high school require students display competencies in the technologies and if so, how will the plan ensure that the students meet these standards?

Develop a clear plan that outlines how all students will have access to the same technologies?

- How can technology extend the school day for the child and make the technologies used during the class period become available at home?
- What steps can the school take to ensure that all students have equal access to the technologies no matter what their academic standing, socio-economic status, disabilities or proficiency with English?

- How can technologies be used to help students with disabilities or special needs?

Develop clear goals and a specific implementation plan to utilize technologies to help make assessment of students more effective and to help support the teachers efforts to improve student learning and assessment?

- How will technology assist with student assessment?

- How will technology be used to track a student's progress towards meeting the Health and Fitness requirements of the WASL?

- How can Physical Education teachers use the new technology to reduce the amount of time they spend on administrative tasks such as grading, attendance and possibly classroom management?

Develop clear goals and a specific implementation plan to utilize technologies to help make teachers more accessible to parents and guardians?

- Have the parents been asked for suggestions on how to improve communication between school and home by the use of technology?
- Have the parents been informed of the use of the new technologies and the benefit it will have on their children?

Monitoring and Evaluation

Develop a process with which to monitor whether or not the strategies used to implement and utilize technology are being effectively used.

- How often will progress be monitored, and who will monitor the progress made towards the goals for the successful use and integration of technologies by the teachers and students?

- How often will the progress made by teachers and students be reported to administrators and other school officials at the school district?
- What steps will be taken if parts of the plan are not going according to schedule?

Decide what indicators of success will be used in judging whether the integration of technology has made a positive effect on student learning and teacher performance.

- How will the school and school district know that the technology integration plan has made a positive effect on student learning?
- How will the school and school district know that the technology integration plan has made a positive effect on Physical Education classroom management?

Part II. Hardware, Software and Technical Support

Needs and Resource Assessment

Determine the technology hardware and technical support needs of the teachers, administration and students in order for them to support the curriculum goals.

Hardware

- What technology is needed in order to support the implementation of the professional development plan?
- Does the school or school district have specifications for the technology that is being purchased? If so is the cost of ownership and maintenance being considered when doing so?
- Can assistive technologies be used that would benefit those students who have not been traditionally helped by technologies?

- How will the plan help everyone have equal access to the new technologies, and is it available for after school use during recreational sports teams or personal use?
By everyone this includes students from historically marginalized groups, students with exceptionalities and those who are not enrolled in Physical Education classes.
- How will the plan make sure that the technologies used are available to all the Physical Education teachers so that they can apply what they have learned?

Technical Support

- How will technical support needs be addressed so that problems with the technologies and the related software can be fixed in a reasonable amount of time?
- What is the estimated ratio of technical support people to amount of technology being purchased?
- How will questions about the new technologies and software be handled so that teachers can have a reasonable amount of support while using the new equipment?
- If the plan ever includes students as a possible technical support option, how will the students be trained and will you encourage all students to become trained?
Will the training become part of the curriculum?

Determine the amount of existing hardware, software and technical support already available in the school and district that could help with the professional development plans.

Hardware

- Does an inventory system already exist within the school or district that can be used to track the age and type of technology? See the Technology Planning Toolkit

P. 85

- Is there any existing equipment that can be used or modified to meet your technology needs?
- Can the equipment that does not meet needs at school be sent home to help with the improved communication between home and school?

Technical Support

- Who provides the technical support and what is the reaction time between calling in for help and that teacher actually getting the help?
- Is this type of technical support meeting the needs of teachers?

Monitoring and Evaluation

Develop a process to monitor whether or not the goals of the Physical Education technology integration plan are being met on time.

- How often will progress be monitored, and who will monitor the progress that is made and the progress that is not made?
- How often will the inventory of the technology be updated and who will do the inventory?

- How often will the progress be reported to the school district and principal? What steps will be taken if the professional development and technology implementation plan are not running on schedule?
-

Part III. Professional Development

It is important to survey those that you work with such as the administrators and the other teachers in the Physical Education program to gain a clear view of their technology competencies. See Levels of Proficiency in Computer Skills P. 93

Do teachers and administrators know how to utilize technology in curriculum?
See Matrix of Professional Teachers' Proficiency in Computer Based Technology P.92

Important questions to consider when designing or implementing a technology development plan in the Physical Education program.

- Do the teachers at your school have the classroom management skills that will allow them to work with the amount of technology available in their classroom? If not, what steps can you take to increase their skill level in regards to classroom management?

A few suggestions include:

- Practice with the existing technology to increase confidence and ease of use.
- Using a limited number of technologies in the same lesson to decrease anxiety of confusion during use.

- Increasing technologies implemented over time to allow for confidence with equipment.
- Do the school's existing sources of professional development focus on using technology to improve teaching and learning in the Physical Education curriculum? If so, do these existing sources of professional development integrate the Components of High Quality Professional Development in Physical Education Technology? P. 80

Needs and Resource Assessment

Review the components listed in the implementation monitoring process plan included under each of the five different headings.

- How will a timeline be included in each component of the plan be used to create an overall system for measuring the successful implementation of the technology plan?
- How will the level of technology used be determined over time? What types of data will be collected and from what types of Physical Education technologies will be used to collect the data? What are the intervals used to collect the data?
- How will the data be collected in such a way to ensure that equity and access issues for students as well as teachers are being monitored on an ongoing basis?

Determine how to evaluate the impact of technology on student learning.

- What criteria will be used to measure student and teacher success in the use of technology? e.g., student portfolios, attendance, test scores, percentage of students attaining grade-level content standards. Are they the same as the criteria established for measuring success in the school district's local improvement plan?
- How will the evaluation treat special populations to determine not only the overall effect of the use of technologies but also its effect on targeted populations, such as low socio-economic status, high achieving students, special education students and so on?
- How will the evaluation take into account varied levels of access to the technology and the type of use?
- Have the teachers been consulted in shaping the criteria that will be used to measure success?
- Have colleges and other places of higher education been consulted for their views of the direction of the technology integration plan?

Research and monitor the evaluation tools provided by the school district.

- Are there members of the local industry that may be willing to donate money or partner in the evaluation process?
- Review what resources from nonprofit organizations, government and industry that might be useful in the technology implementation plan.

- Have other district technology coordinators been contacted concerning recommendations for evaluation design and instruments?

Design a schedule for evaluating the effectiveness of the technology plan while keeping in mind that infusing technology into the daily Physical Education is an ongoing process.

See A Sample Management Chart P. 84 and Implementation Timeline P.83 are provided in the Technology Planning Toolkit. P. 85

- How frequently will the plan implementation be evaluated and who will evaluate the effect of the plan on teaching and student learning?
- How will data be analyzed and collected to ensure that access issues for all students as well as teachers are being evaluated on an ongoing basis?
- Have teachers been consulted in designing the data collection methods?
- Is there an open line of communication between teachers, parents and administrators to provide their suggestions and opinions in the evaluation of the technology plan?
- How often will the results of the evaluation be reported? Monthly, quarterly or yearly?

Determine how and when the results of the evaluation and monitoring process will be used.

- How often will the status of the technology integration plan be reported to the district superintendent, and others involved in the process?

- If necessary, what process will be used to make mid-course alterations as a result of the monitoring and evaluation effort?
- How will strategies that have been a positive effect on teaching and learning be communicated to other subject area teachers, so that they can be duplicated?
- How will the successes of the technology integration plan be documented and publicized throughout the community and the educational community?

Goals

Of critical issue is the development of clear goals and a specific implementation plan for providing professional development opportunities to the teachers.

- What professional development will be provided to meet the needs of the teachers as identified through the needs assessment and curriculum priorities? Does it focus on using technologies to improve teaching and student learning, and does it address any needs technology skills development?
- How will professional development of teachers be implemented and how will professional growth be supported as the teachers apply what they learn?
- Who is responsible? Does the curriculum coordinator, professional development coordinator or the technology coordinator share responsibility for integrating improvement and technology initiatives?
- Is professional development for teachers accessible to all of those who need to participate?

- Is professional development rooted in the school to promote practicing new skills and discussing experiences?
- Do the teachers being trained have access to the technological tools they need immediately after training? How will the professional development plans be synchronized with purchasing plans to ease access to the new technologies?
- Is timely support available as teachers try to apply new technology skills?
- Does the implementation of the new technologies program help the teachers increase their own subject matter knowledge or advance their own professional learning?
- How will the technology plan incorporate See “The Components of High-Quality Professional Development in Physical Education” P. 80
- How will teachers be involved in the planning of their own technology integration plan and will they be developed in accordance with the pre-established priorities of the school and Physical Education program?
- What is the time frame for the implementation of the technology integration program? What is the first and second types of professional development that will occur and so on?

Monitoring and Evaluation

Develop a process to monitor the effectiveness of the strategies and methodologies utilizing the technology that are being implemented.

- How often will progress be monitored and who will monitor the timeline and progress towards the goals of the technology integration plan.
- Were all the aspects of the technology integration plan implemented? If not, then what can be done to make sure that all the components are being used?
- Did all of the teachers feel as though they were supported even after the initial training had commenced and new questions arose?
- Did the teachers use what was taught to them and has the professional development program resulted in changes in the instruction?
- If changes in instruction have occurred, was the effect on student learning a positive one?
- How often will the status of the technology integration plan be reported to the principal, district superintendent and the local governing board?
- What steps will be taken if portions of the plan are not being properly implemented?

Part IV. Funding and Budget

Needs and Resource Assessment

List all of the costs associated with the implementation of the technology.

Identify the current budget for implementing the technology you plan to use.

- What provisions in the current budget are made for technology spending and can the spending continue over time?
- Is additional fund raising needed to cover the costs of the technology that you plan to buy?

Identify past, present and future sources of funding for the technology you are interested in purchasing. A Sustainability Chart is provided. P. 88

- Has the amount of funding from the district for technology been identified?
- Have alternative sources of funding been identified?
- Are there any federal, state or local programs that could provide some money for the technology that is needed?

Consider options for reducing the costs.

- Are there any nearby industry experts or non-profit organizations that would be willing to partner up on the acquisition and maintenance of technology of the classes?

- Has the idea of purchasing the technology been proposed to the parents so that they are aware that the school is trying to acquire this equipment? If this is done someone may step forward with funding and support.
- Have you considered the idea of leasing the equipment so that the cost and technical support issues may be resolved?
- Can the professional development being proposed be done in a more cost effective manner by possibly integrating the technology training for teachers into previously planned professional development days.

Goals

Develop and implement annual budgets that project out 5 or more years.

- Within each year's budget have one time costs, and continuing costs, such as those for maintenance and repair been accounted for?
- Can any of the professional development be provided from a cheaper source to help save money?

Provide for ongoing technical support.

- Is it more cost efficient to buy extended warranties on the equipment, or use teachers and staff as technical support?
- Is back-up equipment available if a key component of the technology breaks down? Is back up equipment even necessary for the technology you plan to use?

- Have you considered training students and parents to be troubleshooting or technical support options?

Plan for the equipment you purchase to become obsolete.

- Has a replacement cycle or plan been built into the program? Will enough money be set aside when the equipment needs to be replaced?
- Do you plan to donate older yet still useful equipment to other schools or organizations that could make use of the equipment once you are through with it?

Monitoring and Evaluation

Establish a feedback loop to monitor and track progress.

- Have regular meetings with principals and district heads been planned to update them about the progress of obtaining funds for the technology, explain and brainstorm about fixing problems?
- What steps will be taken if parts of the Funding and Budgeting plan do not go as planned?

Part V. Monitoring and Evaluation

Needs and Resource Assessment

Review the implementation monitoring process that is included under each component of the plan.

- How will the level of technology used over time be measured? What types of data will be collected?

- How will data be collected and analyzed to ensure that equitable use is given to all students and teachers, and that this is monitored over a continuing period?

Decide how to evaluate the effect technology has on student learning over time.

- What criteria will be used to measure student and teacher success? Does the school district employ a similar method of measuring success with the new technologies?
- How will the evaluation treat those groups who have been historically marginalized? Will the evaluation seek to not only evaluate the effect of technology use but also the effect of technology on those specific groups?
- How will the evaluation take into account different levels of access and types of use?
- Have teachers and administrators collaborated on establishing the criteria that will be used to determine the teacher's and student's success?
- Have local colleges and universities been contacted for assistance?

Consider using evaluation and monitoring tools that are provided to the district at little or no cost.

- Are there nearby members of industry that might be willing to partner with you to provide help during the evaluation process?
- What resources might be helpful from the community or non-profit organizations?

Design a schedule for evaluating the effects of the technology integration plan that takes into account the idea that technology and the professional development program is an

evolving process. See Management Chart P. 84 and Implementation Timeline P. 83 in the Technology Planning Toolkit. P. 85

- How often will someone evaluate the implementation plan and who will evaluate it?
- How will data be collected and analyzed to ensure that equity in access is given to all teachers and students.
- Is there an open line of communication for all of those involved in the technology? This must include teachers, parents, students, administrators and interested community members.

Determine how and when the results of the monitoring process will be used.

- How often will the status of the technology integration plan be reported to those in charge, such as the principle, school district officials and possibly invested community members?
- If necessary, what steps will be taken to make changes to the plan as needed?
- How will strategies that have had positive effects on teachers and students be reported to others so that they can be used in other classes or schools?
- How will your technology success stories be spread or publicized?

Students with Exceptionalities

Before implementing the technology plan one must consider the questions listed below in regards to students with exceptionalities.

It is extremely important to include students with exceptionalities in your technology integration plan. Students with exceptionalities will be defined as high achieving students, low achieving students, students with physical exceptionalities and special education students.

- Are lower achieving students that have been mainstreamed, been given the same access to technology as students in the same class?
- Are these same lower achieving students given individualized instruction on how to use the technology?
- Are the lower achieving students goals being strived for as outlined on their IEP?
- How is the teacher going to assess these lower achieving students on their content knowledge related to the Physical Education technology?
- What steps are the building administrators going to take to ensure that the students with exceptionalities are not being left behind?
- Are any adaptive classes going to be offered for those students needing this specialized service?
- What techniques shall the teacher employ to make sure that the higher achieving students in the class are not getting off task because they are not being appropriately challenged? Will the teacher use techniques such as teaching by

invitation, reciprocal learning, or peer scaffolding to properly challenge advanced students?

- How will the teacher use the previously mentioned techniques in regards to the new technologies being implemented?
- How will the teacher promote the program both within the school and around the district?
- Will the Physical Education program be required to give updates on the progress of the students to anyone within the school or school district?
- How will the students be recognized for their efforts within the technology program?

Students from Historically Marginalized Groups

Before implementing the technology plan one must consider each question listed below in regards to students from historically marginalized groups.

Questions to consider when including students from Historically Marginalized Groups into the technology integration plan:

- Are the students from historically marginalized groups going to be given the same access to the technology as other students?
- Is any specialized instruction needed for these groups of students? If so, what types of instructional techniques will the teacher employ?
- How is the teacher going to assess the students from the historically marginalized groups on their content knowledge related to the technology?
- Are any different assessment techniques required for students from these groups?
- What steps are the building administrators going to take to ensure that the school's historically marginalized groups are not being left behind?
- Will the teacher promote the efforts of the students from historically marginalized groups within the school or district? If so, how will the teacher promote the program both within the school and around the district?
- Will the Physical Education program be required to give updates on the progress of the students to anyone within the school or school district?
- How, or will, the students be recognized for their efforts within the technology program?

How Constructivism Works with Physical Education Technology: Constructivism's impact on Student Learning in Physical Education

The following has been divided up into three different parts. Each one deals with a different part of education and how constructivism impacts the teacher's job of student learning.

Curriculum: With the use of constructivism in the curriculum there is a need for the elimination of a standardized curriculum. Constructivism promotes using curricula customized to the students' prior knowledge as well as emphasizing hands on problem solving. Constructivism was almost tailor made for Physical Education and the integration of new technologies. Since an emphasis on hands on learning is used in constructivism, the introduction and integration of new technologies will be much easier in this type of subject. Teachers and students alike need time and practice in order to become proficient in the use of the new technologies. Both teachers and students will be able to use the essential elements of constructivism to create their own knowledge and become proficient users of the technology.

Instruction: Under the theory of constructivism, teacher's focus on making connections between facts and fostering new understanding in students. Teachers can tailor their teaching strategies to student responses and encourage students to analyze, interpret, and predict information. The teachers will also be able to rely heavily on open ended questions in order to promote extensive dialogue among their students. This will be essential for the teachers so that they can encourage their students to peer scaffold one

another and to use reciprocal learning techniques. The peer scaffolding and reciprocal learning techniques which use many of the essential elements of constructivism are essential in the process of learning the new technologies.

Assessment: Part of what makes constructivism unique is that it calls for the elimination of grades and standardized testing. Instead, constructivism uses assessment as part of the learning process so that students play a larger role in judging their own progress. This is not to say that by following the constructivist model that you will call for the elimination of the WASL or other similar state mandated testing instruments. The new technologies will help greatly in this process of self assessment that is prescribed by the constructivist model. The technology guides the students through the process of self evaluation and gives them progress reports as they learn, with the hope that they will in the future become self directed learners and can be self motivated to stay active for a lifetime.

The Components of High Quality Professional Development
in Physical Education Technology

1. Uses student assessment data including student feedback, teacher observations, and analysis of student work as part of the process for the improvement of their individual learning. The purpose of using a variety of data collected from the students is to allow teachers to know their students well, and then to use that knowledge to plan professional development that will increase the student's ability to learn and use technology.
2. Uses a long term professional development plan that is connected to the rest of the school. The technology plan must also reflect the goals of the school and the school district. Planning for professional development is a long term process that is linked to other planning activities around the school. It is important to take teacher feedback and formative evaluations from teacher learning and use that information to make adjustments to the professional development plan.
3. Provides time for learning in the Physical Education technology plan program to happen in a meaningful way. Time can be one of the biggest road blocks for providing high quality learning experiences for teachers. Time to plan, reflect and design new technology driven lessons is essential for any technology integration program to succeed. Teachers need time both in and away from school in order to pursue learning opportunities.
4. Respects and encourages the leadership of the Physical Education teachers.

There are a large variety of leadership positions that a teacher can take within a technology infusion program, such as mentoring new teachers, or those who are hesitant to learning new technologies. Physical Education teachers can also coordinate networks among other teachers, develop technology curriculum and advise their fellow teachers.

5. Develops Physical Education teachers' pedagogical and content knowledge and the skill level to integrate both into a Physical Education program that is full of technology.

Professional development strategies such as networks and workshops are helpful in closing the achievement gap between the highest and lowest achieving students.

6. Provides and promotes the use of continuous learning contemplation. Through contemplation, most Physical Education teachers come to understand content standards and therefore can assess their teaching with regards to how they are moving goals of the technology integration plan. Strategies for continuous contemplation are creating teaching portfolios, keeping journals, and doing studies of individual students.

7. Provides for collaboration along with plenty of opportunities for learning of the new technologies. A collaborative learning community is essential to the professional development process. It is characterized by activities such as joint planning and problem solving. Teachers will be especially good at peer coaching, reciprocal learning, study groups, and networking with teachers from other schools.

8. Follows the principles of good teaching and learning that respects the learning environments that are conducive to adult learning. The conditions that most often allow for quality learning experiences in adults are attending to what is learned, how it is

learned and where it is learned. If these ideas are used, the likelihood of your technology plan taking hold are going to increase.

9. Creates a broad support for the Physical Education technology plan from community members and from all portions of the school. The paths of communication need to be

opened between the parents, community members and local businesses that might possibly provide resources for teachers and the school. Support for professional development for teachers, within the school can be built through mutual respect and communication.

10. Builds in accountability practices and evaluation of the Physical Education technology plan to provide groundwork for future planning. Program evaluation is referenced against teaching standards and students content standards. Therefore every part of teacher learning is linked to student learning.

Sample Management Chart

The following table is meant to explain the leadership structure for the implementation of the Physical Education Technology Plan.

Individuals or Persons Responsible	Responsibilities (Only Examples)	Estimated Time of Completion
	Main person in charge, provides management and coordination.	
	Coordinate staff development	
	Manage and coordinate acquisition and installation of software and hardware.	
	Collect data regarding teachers' computer skills.	
	Collect data on the effectiveness of Physical Education technology on student learning.	
	Collect data on staff development and their level of proficiency with new Physical Education technologies.	
	Collect data regarding staff development focused on student computer knowledge and skills.	
	Collect data regarding staff development that is focused on the integration of technology into the Physical Education curriculum to improve student achievement.	
	Use the collected data to evaluate the progress toward goals and to make modifications.	

Physical Education Technology Planning Toolkit

Example table of Action Steps in process of Physical Education technology integration plan. It is again separated into five different categories.

Topics included: I. Curriculum II. Professional Development III. Hardware, Software, and Technical Support IV. Funding and Budget and V. Monitoring and Evaluation.

I. Curriculum

Actions or Steps	Person or People Responsible	Target Date for Completion
Access the availability of Physical Education technology to meet the needs of the Physical Education teachers and students.		
Access the school's current use of technology to support Physical Education teaching and learning.		
Review the school's curricular goals as related to Physical Education and general technology use throughout the school.		
Create a specific plan for the implementation of using technology to improve teaching and learning in Physical Education.		
Create an implementation guide that describes how students will acquire technological information for the use of the Physical Education technologies and how it will help them succeed within the classroom.		
Develop a plan to make sure that all children have equal access to the Physical Education technologies.		
Create a clear guide that will make student assessment more efficient and effective and one that will support student learning in the use of Physical Education technologies.		
Generate a process to monitor whether the strategies being implemented are actually improving student performance and retention of Physical Education technologies and themes.		
Create indicators of success that will be used to evaluate whether or not the Physical Education technologies being used are having a positive impact on student achievement.		

II. Professional Development

Actions or Steps	Person or People Responsible	Target Date for Completion
Create and hand out a survey to the Physical Education teachers and administrators on their current technology skills and needs for professional development.		
Research possible professional development opportunities for the Physical Education teachers and other staff and administrators.		
Propose a plan for providing professional development opportunities based on the needs assessment returned from those who took it.		
Develop a process to decide whether the strategies and methods utilizing technology are being implemented in the professional development of the Physical Education teachers.		

III. Hardware, Software, and Technical Support

Actions or Steps	Person or People Responsible	Target Date for Completion
Determine the technology and support that is needed by the Physical Education teachers, students and the administration to support the activities in the classroom and the professional development of the Physical Education teachers.		
Seek advice and support from experts in the field such as college professors and technology support professionals.		
Determine what existing hardware and software is already available to the school that can be used in the Physical Education classroom.		
Develop a process to monitor the level of effectiveness that is being achieved by the technology implementation plan.		

IV. Budget

Actions or Steps	Person or People Responsible	Target Date for Completion
Isolate all costs associated with the implementation of each Physical Education technology component.		
Define the current budget for the implementation of each component of technology.		
Decide if any cost reducing measures can be made.		
Develop an annual budget for the long term. Possibly five or more years.		
Provide ongoing technical support to all Physical Education teachers and plan for the date in which all equipment becomes obsolete.		
Create a process to determine if the technology being used is actually working to improve student learning and Physical Education effectiveness.		

V. Evaluation

Actions or Steps	Person or People Responsible	Target Date for Completion
Evaluate the monitoring process included at the end of every component of the plan.		
Determine a way to evaluate what the effect on student learning has been.		
Consider evaluation tools provided by the school district.		
Design		

Wilde, J. (1996, March)

Sample Sustainability Chart

Define the school and school district's role in sustaining the technology over the next three or more years.

Type of Support Provided (Examples)	Individuals or Responsible and their Job Title	Plan for Providing this Support
Ongoing equipment repair, maintenance and replacement of the Physical Education technologies and related technologies.		
Technical support provided during school hours.		
Technical support after school hours.		
Professional development for Physical Education teachers.		

Chart of Community Partnerships

The table below is meant as a tool to assist in the organization of community members who wish to be involved in the Physical Education technology implementation plan. If someone you had planned on for help for whatever reason does not lend support, simply state, "No Involvement." In the corresponding boxes describe what steps you will take to encourage this member of the community to assist in the plan as previously expected.

Type of Partnership	Name and Contact Info	Role in Development of Technology Plan	Role in Supporting the Project
Parents			
Local Business			
Government Groups			
Colleges or Universities			
Community Organizations			

Checklist of Components

Use this checklist to determine whether the school's Physical Education technology plan includes all of the components that are necessary for student centered learning.

Curriculum

- Does this component include a realistic strategy for using Physical Education technology to improve teaching and learning as described in the school's comprehensive improvement plan?
- Does the component include benchmarks, goals and a timeline for implementing the strategies?

Professional Development

- Does this component define the needs of Physical Education teachers and their Professional Development needs, as well as technical support staff so that the strategies for using Physical Education technologies can be met along with curricular goals and student achievement needs?
- Does the Physical Education technology plan include a timeline and benchmarks for implementing the planned strategies?

Infrastructure, Software, Hardware, and Technical Support

- Does this component include a timeline and list of the infrastructure, software, hardware and technical support needed to support the implementation of the Physical Education technology plan?
- Does this component include a timeline and goals for obtaining the previously identified infrastructure, software, hardware and technical support?

Funding and Budget

- Does this component include a budget that identifies the costs and potential funding sources for supplying the infrastructure, software, hardware and technical support that is needed during this Physical Education professional development plan?

Monitoring and Evaluation

- Does this component include a process for monitoring that enables the school to monitor the implementation of the technology plan so that any adjustments can be made during the course of the implementation of the program?
- Does this component include an evaluation process to determine if there is a positive or negative effect on student learning?
- Are there people who's job it is to take responsibility for monitoring and evaluation?

Jones, B. F., Valdez, G., Nowakowski, J., & Rasmussen, C. (1995)

Matrix of Professional Teachers' Proficiency in Computer Based Technology

Factors to Consider	Professional Profile	Performance Indicators
Communicates with others in a variety of available electronic media	<ul style="list-style-type: none"> - Identifies and uses digital communication tools in the appropriate manner. - Uses digital tools to communicate with students, parents and members of the community to enhance learning and management 	<ul style="list-style-type: none"> - Evidence of the use of a variety of communication tools such as e-mail, listserv or web page. - Evidence of the management of information using technology to increase communication such as web pages and voice mail.
Collaborates with others using computer-based collaborative tools	<ul style="list-style-type: none"> - Supports student learning through collaboration with parents, experts in the subject matter and educators while using the digital tools. - Participates in professional development program by using digital communication tools. 	<ul style="list-style-type: none"> - Evidence of sustained communication with parents, students, and colleagues through mailing lists video conferencing and online staff development. - Student projects utilize digital tools to interact with subject matter experts.
Collaborates with other teachers, mentors, librarians, resource specialists and other technology experts.	<ul style="list-style-type: none"> - Uses digital communication tools to work with educators and subject matter experts to design classroom activities to support student learning - Uses the expertise of others to support the learning process and technology enhanced curriculum.. 	<ul style="list-style-type: none"> - Student work that examples evidence of active collaboration with outside of school experts - Cross grade-level projects with other students and teachers.
Contributes to local decision making regarding the use of technology and acquisition of technological resources.	<ul style="list-style-type: none"> - Provides leadership by participating in school wide decision making that support leaning through the use of technology. - Explores new technologies and recommends innovative educational tools that are appropriate for the needs of the school and students. 	<ul style="list-style-type: none"> - Pursues continuing education such as educational technology, attendance at conferences or online conferences. - Participates in grade level activities to develop a school technology plan.

Levels of Proficiency in Computer Skills Trotter, A. (1999, September 23)

	Introductory	Intermediate	Proficient
General knowledge of the basic computer technology as well as knowledge of software and hardware terminology.	<ul style="list-style-type: none"> - Is able to identify hardware components and their purpose. - Identifies windows, menus and icons. 	<ul style="list-style-type: none"> - Uses windows, menus and icons. - Uses basic peripherals such as CD-Rom and storage media. 	<ul style="list-style-type: none"> - Incorporates general knowledge of basic hardware and software into lesson design
Knowledge of the appropriate care and operation of the computer hardware as related to Physical Education.	<ul style="list-style-type: none"> - Turns on and off the computer and peripherals - Uses a mouse - Inserts and ejects CD-ROM and discs - Can operate software from the disc hard drive and CD-ROM - Names, saves, retrieves and revises a document 	<ul style="list-style-type: none"> - Organizes the desktop - Formats and names discs. - Copies documents between computer and discs. - Chooses printer location 	<ul style="list-style-type: none"> - Allocates as memory needed - Sets preferences - Organizes files and programs - Can install software - Uses appropriate anti-virus software
Knowledge of basic troubleshooting techniques	<ul style="list-style-type: none"> - Restarts a frozen computer - Identifies directly connected or networked printer problems 	<ul style="list-style-type: none"> - Troubleshoots basic hardware and software printing problems before seeking tech support 	<ul style="list-style-type: none"> - Troubleshoots common hardware, software, and printing and network problems.
Integration of student learning and classroom support.		<ul style="list-style-type: none"> - Cites applications of technology use as an educational tool. 	<ul style="list-style-type: none"> - Uses technology tools to support teaching and learning process

Sample Lesson Plan Format

Lesson Plan Title:

Author(s):

Grade Level:

Goal(s) and Learning Objective(s):

Materials/Resources: Include quantities. List websites as hyperlinks.

Procedure for Teaching: Step-by-step plan that others could follow

Student Product: Journal entry, worksheet, artifact (include a copy).

Assessment: Written or oral (include a copy).

How will you show that your objectives were met; that learning took place?

Reflection:

How well did your plan help meet your goals and objectives?

In retrospect, what else might you have done?

Include student comments, questions, interest, engagement.

How did this assignment promote student learning? How could it be modified?

Write personal thoughts, feelings, observations, and ideas about the lesson that will inform others who may want to use your lesson plan.

Sample Introductory Lesson Plan

Lesson Title: Learning the Basics of Using Physical Education Technology

Author: Tom Haeck

Grade Level: Professionals

Goal(s) and Learning Objective(s): Teachers participating in this lesson plan will display competencies in the use of various Physical Education technologies such as Heart Rate Monitors, Pedometers, Body Composition Scales, Fitness

Cognitive: Teachers will be able to list all Physical Education technologies covered and state their benefit to the classroom.

Affective: Teachers will be able to explain why they believe these technologies are valuable to their future classrooms.

Psychomotor: Teachers will be able to demonstrate proper use of these tools within their curriculum.

Materials/Resources: One for every professional,
Heart Rate Monitor and Chest Straps. (HRM)
Pedometer
Body Composition Scales (BCS) Only one needed for class period.
FitnessGram, One Promotional Copy for each Physical Education Professional
ActivityGram, One Promotional Copy for each Physical Education Professional
One copy of the lesson plan for each teacher in attendance.

Procedure for Teaching:

Introduction of all 5 Physical Education Technologies. Heart Rate Monitor, Pedometer, Body Composition Scale, FitnessGram and ActivityGram.

Provide the following information as a handout so that the teachers can follow along, study and have their own copy of the following information.

Heart Rate Monitors

Explain basic function and purpose of the Heart Rate Monitor and give them an example. Such as the benefits to students from using Heart Rate Monitors and that the teacher can provide the students with an understanding of how to:

- Monitor and maintain a health-enhancing level of physical fitness
- Take personal ownership of working to improve their fitness and skill level
- Recognize the five components of fitness and how to impact the body positively with each

Heart Rate Monitor and health assessment systems and software can equip the teacher with the tools to:

- Develop personalized health and fitness portfolios
- Objectively assess your students' health and fitness
- Track individual and class performance
- Align with NASPE and state Physical Education standards
- Use visual evidence to evaluate a student's effort

Pedometers

How do pedometers work?

The majority of pedometers use a swing-arm or pendulum mechanism which creates an electrical signal with every step taken. These electrical signals are then calculated and displayed on an LCD screen as steps, miles, or calories burned, depending on the features offered by the pedometer. In fact, if you listen closely, you will be able to tell if your pedometer is mechanical by the small clicking sound it makes every time you take a step. Most advanced pedometers currently on the market opt for digital detection versus the conventional swing-arm or pendulum mechanism, making them even smaller and more accurate.

Pedometer Accuracy

Pedometers, if used correctly, can be quite accurate with as low as +/- 5% margin of error. Accuracy can be affected by many factors, such as placement on the hip, running, jogging or not being placed level with the ground. To ensure the best results possible from your promotional pedometer, keep these few tips in mind:

Pedometer Placement

- Most pedometers should be worn right above the hip of the most dominant leg, clipped directly to a belt or garment.
- Pedometers must be worn leveled with the walking surface in order for it to be accurate; therefore, they should not be placed in shirt pockets, bags, pant pockets or anywhere else other than above the hip.

Pedometer Use

- Ideally, pedometers will be most accurate when used during jogging or walking. The reason is that your steps are more pronounced and the impact of your foot hitting the ground is registered with greater accuracy.
- If used throughout the day to monitor your steps, the pedometer will not be as accurate because the results will be affected by sitting down/getting up, changes in stride, jumping, crouching, or bending.

There are many different uses for pedometers in the classroom. They can be used on an everyday basis as a part of a continuous log or journal. They can also be used as a part of a nutrition or calorie expenditure unit. The pedometer has a calorie and miles traveled feature built in that allows for a variety of uses within the physical education setting. The pedometer is also an excellent objective way to measure student performance and participation. The teacher can assign a certain amount of steps that they would like the student to accumulate during the course of the class period.

Body Composition Scales

The Body Composition Scale (BCS) is an easy, accurate and effective way in which to track student weight and body composition measurements. The System does not require use of calipers, pinching or any other method. The student simply removes all footwear including socks, the operator enters height, age and gender and has the student step onto the scale. Within seconds, weight, BMI and body fat percentage is displayed on the LCD display.

More in-depth results can be obtained by studying the included software. Information that can be acquired from the body composition scales are hydration levels, fat free mass, and basal metabolic rate.

The benefit to students is that it can provide real life information on all of the above listed body systems, including, weight, basal metabolic rate, body fat, hydration levels, fat free mass, and basal metabolic rate.

FitnessGram

FitnessGram is a fitness test that can be administered multiple times per year and has the potential to teach healthy habits as well as integrate the computer software into the curriculum. The software offers an objective method with which to grade student participation and performance.

FitnessGram is a more effective fitness test for three reasons:

First, it compares scores to carefully researched and developed health standards, rather than to national averages. By using these standards, called Healthy Fitness Zones, the test administrator knows without a doubt whether a child meets the minimum recommendation for being fit on each test item.

Second, it emphasizes measures of health-related physical fitness instead of the

performance of sport-related skills.

Third, it goes beyond measuring fitness to recommend physical activity program options that will help students make it into the Healthy Fitness Zones for those areas where they need improvement.

FitnessGram is one of the first health-related fitness tests to use this method of testing and measuring results, and it's been used for nearly 15 years.

FitnessGram provides everything you need to accurately assess students' fitness levels and identify individualized approaches to improve physical fitness. The software program is designed to make the teaching and implementation of the program easier every step of the way.

Teacher Benefits include: Individual student test results, test results for all students, level of achievement compared to the Healthy Fitness standards and suggestions for improvement that can be shared with students, parents and administrators.

ActivityGram

ActivityGram is an important component of any physical activity unit. Through the use of the ActivityGram software, it helps the students collect information about their physical activity in the form of a journal.

The ActivityGram assessment is a recall of the students previous day's physical activity, based on a validated physical activity instrument known as the Previous Day Physical Activity Recall (PDPAR). In the assessment, the student reports his or her activity levels for each 30-minute block of time during the day. The format is designed to accomodate both school and nonschool days.

The assessment, provided through the available software, provides detailed information about the student's activity habits and prescriptive feedback about how active he or she should be. It is very similar to the FitnessGram assessment.

-Because of the cognitive demands of recalling physical activity, it may be difficult for young children to get accurate results. Thus, it is recommended that the ActivityGram program be used with students in fifth grade and older.

-Break teachers up into pairs and have them brainstorm with their partner about different Physical Education content areas in which they could integrate these technologies.

-Allow the pairs about 15-20 minutes to come up with a complete list.

-Have the pairs share with the group their ideas. Be sure to have the ideas displayed somewhere where everyone can see, so that the ideas can be written down.

-Assign the pairs to create a hard copy of their brainstorm for every member of the group by their next meeting.

Assessment:

In summation, have each teacher write down on their own sheet of paper a way in which they can implement each one of these technologies into their own curriculum. Make sure the teachers include the benefit to the students educational process by way of the Physical Education technology.

Student Product:

Teachers will bring a hard copy of their brainstorm for every member of the group by their next meeting.

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CHAPTER V

SUMMARY AND CONCLUSION

Heart disease is the second leading cause of death for adults in the United States. Risk factors associated with heart disease are appearing in prepubescent children which leads to an unhealthy child and consequently an unhealthy adult. The fact that a preventable disease is the leading cause of death in this country is astounding. At the turn of the 20th century, the major causes of premature disability and death in this country were infectious diseases. Today, virtually all the leading causes of premature death are rooted in unhealthy behaviors or social/environmental conditions, consequently many are preventable. Something needs to happen now to turn around this epidemic of obesity and heart disease.

Through the use of Physical Education technologies, student's awareness and comprehension of health and fitness themes can be increased, therefore leading to a more health conscious adult. For our future students, this knowledge and hopeful appreciation of their own health affecting behaviors will allow them to make healthy lifestyle choices and become healthy adults. This is the first step in breaking the cycle of an unhealthy America.

This project has covered five major areas that affect the successful implementation of a Physical Education technology plan:

I. Curriculum

II. Hardware, Software and Technical Support

III. Professional Development

IV. Funding and Budgeting

V. Monitoring and Evaluation.

These areas will help keep the followers of this guide on track and accountable for every action and step that is taken during the implementation of the Physical Education technology plan. Included in each section were suggested actions and guiding questions that were designed to help with the creative thinking of the followers of the guide. If all questions are considered and answered, then every part of the technology plan implementation process should be successful.

The Physical Education Technology Planning Toolkit and the other charts and tables were carefully designed so that it would give the readers a framework from which to work while they implemented the ideas and suggestions that are given in this guide.

Also included in this guide are evaluation tools that are meant to be useful during the beginning stages of planning. These tables will help you accurately discover the level of technology competency already achieved by the teachers in your school. Included at the end is a sample lesson plan and sample lesson plan format. This sample lesson plan is an introduction to the Physical Education technologies that are commonly used in today's Physical Education classes. It can be taken as is and used as an introductory lesson to help Physical Education teachers become familiar with the technology they will soon employ in their everyday lessons.

The project discussed ways in which to include all groups of student into the plan. Students with exceptionalities, high achieving students, low achieving students, low socio-economic status students, as well as students from historically marginalized groups. They are an important part of every school and need to be included in the Physical Education program. They also need equal access to all technologies and need a chance to succeed.

If used as designed this project will provide all of the pieces necessary to successfully integrate Physical Education technologies into the curriculum of the school. The needs of the school and district have been taken into account and have been carefully considered during the creation of this project.

To those who plan to use this project to integrate Physical Education technology into their school, please do so with pride and passion similar to the kind that was used to put this project together. This project means a lot to the author and the only way to make this project a success, is if those who follow it take it seriously and put forth all of their effort to make their Physical Education program a success, for themselves and for their students.

CHAPTER VI

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