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Using Information and Communications Technology in Physical Education

Michael Chia

INTRODUCTION

The use of information and communications technology (ICT) in Singapore schools is not a recent phenomenon. Since 1981, the Ministry of Education (MOE) has recognized the potential of ICT in education and has used ICT for learning in curriculum subjects in a number of pilot projects across Singapore schools (Ministry of Education, 1995). The use of ICT in Singapore schools has not only been pervasive but is also increasing at an unprecedented pace since the launch of the Singapore Information Technology (IT) Master Plan for Education in Singapore in April 1997. The IT Master Plan for Education is part of the country's overall IT Master Plan which is a $2 billion initiative to wire up the entire island to facilitate an intelligent learning nation. One major aim of the IT Master Plan for Education is to have 30% of the school curriculum time, irrespective of grade level, devoted to ICT-related activities. Already there are objective indicators that Singapore is very determined to infuse ICT into the education of her young people. An IT survey that involved 27 countries including Hong Kong, France, Italy, Denmark, Norway, Japan and Singapore was conducted by the International Association for the Evaluation of Educational Achievement in 1998 (The Straits Times, 1999). The report ranked Singapore ahead of all the other countries surveyed in terms of the percentage of primary (93%) and secondary (96%) schools equipped with Intel Pentium or equivalent high speed processors, Windows 95/98, Win NT, Mac-OS 7.5 or more sophisticated computer programs. In terms of IT training for teachers, Singapore was also ranked ahead of the other 26 countries, with 80% of primary, 74% of secondary and 58% of post-secondary teachers receiving IT-training. Singapore was ranked third in terms of student-computer ratios, behind Canada and Norway. The speed and accuracy with which technology can make available useful information to teachers and students has been heralded as the new dawn of education. 'Cyber-protagonists' predict the inception of virtual schools of the future where virtual teachers work with virtual students in virtual classrooms. What does all this mean for physical education? Is it an anathema to experience 'cyber physical education'? Is not physical education, in essence, education through the physical? Already there is apparently a vast array of recreation games that is
available in the form of CD-ROMs such as World Cup Soccer, Microsoft Golf and Olympics where the active involvement in these seemingly interactive and realistic games is possible with a minimal of caloric expenditure. Will there come a time when ICT may decrease the need for physical activity as young people live an isolated ‘cyber-like’ existence where armchair physical activity programmes become vogue and real physical activity becomes passé? Are technology and physical education strange bedfellows, a marriage of convenience or can they be partners for life? More cogently, is ICT a ‘poison chalice’ for physical education, to be opposed vehemently?

**Information and Communications Technology: Friend or Foe of Physical Education?**

Critics of ICT have blamed increased multimedia use (television, video games, and computer use) as one of the significant causes of increased patterns of physical inactivity among young people (DuRant, Thompson, Johnson & Baranowski, 1996; Pate, Trost, Felton, Ward, Dowda & Saunders, 1997). Increasingly, it seems that more young people than before spend their time in front of the computer engaged in some form of ‘cyber-activity’, either for information or for pleasure. However, research related to physical activity in young people (Armstrong & Welsman, 1997) and promoters of physical activity and advocators of heart health (Harris & Elbourn, 1990) in young people have used ICT to further their cause.

Television, video players and computers are clearly double-edged swords in this respect. On the one hand, one may argue that young people can be more physically active by using less of the available technology and playing outdoors. Yet, in Singapore, television and the computer network are often the media of choice in the transmission of healthy lifestyle messages, and communication of encouragement for people to be more physically active. The evidence is apparent. For instance there have been many television programmes that are devoted to health and exercise (e.g. Executive Health, Mind Your Body, Alternate States and Head to Toe). There are also many web sites hosted by the various government agencies such as the Ministry of Health (http://www.gov.sg/moh/), the Singapore Sports Council (http://www.ssc.gov.sg), and the National Healthy Lifestyle Committee (http://www.healthylife.org.sg), as well as commercial enterprises such as www.healthwho.com, www.ezyhealth.com.sg and www.healthanswers.com.sg, that are devoted to promoting a healthy lifestyle among the population. Moreover, proponents of ICT use in
physical education argue that using ICT in physical education may represent a real chance to improve the quality of physical education in the new millennium. Physical education teachers must seek to find answers to the question as to whether there are facets of physical education that can be better taught virtually. Indeed Locke (1997) proposes that physical educators ask two main questions: what will ICT do for us and what will it do against us? What are the pros of 'cybernetizing' physical education? Can more be achieved for physical education by 'decybernetizing' the subject? Ironically, an opinion poll on the issue may be conducted among physical education teachers on the World Wide Web.

**How is ICT Currently Used in Physical Education?**

Information and communications technology can be used in a number of ways in physical education, namely as utilities, in assessment and in computer-assisted instruction and learning. However, in many countries including Singapore, its use in physical education, especially in the area of computer-assisted instruction and learning, has been rather limited for one reason or another.

**ICT as utilities**

The use of computer utilities such as word processing software and data base managers is perhaps the most common use of ICT in physical education. These software are essential tools for increasing work efficiency and the productivity of physical education teachers. Having lesson plans, assignments, tests, handouts, and other teaching materials in a word processor make their use and revision much easier than in the past. Once the information is stored on the computer, physical education teachers can share with each other electronically in the form of e-mail and also easily modify teaching materials for their own purposes. In many schools, data base managers such as spreadsheets are used for recording, sorting, analysing and storing pupils' performance data. Many physical education teachers cannot do without these computer applications.

**ICT as a tool for assessment**

The use of computers for assessment in physical education holds great promise but the available technology has not yet been fully exploited. Contrarily, the use of ICT appears to have been limited to fitness assessment. In Singapore, this means teachers of physical education
going through the annual routine of inputting the results of annual physical fitness tests onto a spreadsheet, which then automatically computes the grades from the raw scores.

**HOW ICT CAN BE USED IN PHYSICAL EDUCATION**

**ICT as a tool in computer-assisted instruction and learning**

The use of computer-assisted instructional software in physical education in Singapore remains largely unexplored but offers some interesting possibilities. McLean (1996) has reviewed a number of computer-assisted physical education instructional software and has provided the phone numbers or URLs for retrieving the programs from the Internet — and there are more than might be expected. The use of computer-assisted instruction can be used for disciplinary knowledge (e.g. Physics of Sport), activity (e.g. Interactive Volleyball) and fitness (e.g. Exercise for Life). In Singapore, there are many web sites that contain a plethora of useful information on health, diet and exercise, as well as special software that can be used on-line for physical fitness and dietary assessments. Some of these software also allow for the periodic monitoring of physical fitness and dietary habits:

- [www.moe.edu.sg/cpddl/pe/taf](http://www.moe.edu.sg/cpddl/pe/taf)
- [www.healthylife.org.sg](http://www.healthylife.org.sg)
- [www.lightliving.com](http://www.lightliving.com)
- [www.ezyhealth.com](http://www.ezyhealth.com), and
- [www.parentzone.com](http://www.parentzone.com)

These on-line ‘cyber-sites’ can be used to complement physical education lessons, where they are appropriate and can add value to the lessons.

Video-assisted instruction, for instance, has been used in physical education for years when videotapes are played for students, usually as part of a wet-weather programme. In certain situations, it may be possible to use such technology as a teaching and instruction tool, to complement teacher or student demonstrations of skills during indoor physical education lessons where sports skills like badminton, table tennis, basketball and volleyball can be taught and practised.
An interactive volleyball CD-ROM was developed last year by the Sports Technology Research Centre (STRC) at the University of Calgary. It offers 400 volleyball drills and even allows the user to download their own combination of drills. An interactive encyclopaedia of stretching exercises where students can learn proper stretching technique in full motion video sequences is also already available commercially. More information on this CD-ROM, and others under development, can be gleaning from the web site www.savvyknowledge.com. Although the use of computer-assisted instruction will grow, there has been little research on the subject in physical education. This is an area that warrants more research attention as the use of computer-assisted instruction in curriculum subjects, including physical education, continues to grow.

**ICT assisting in the generation of electronic student portfolios**

Videotape equipment can be used for student assessment. For example, students' skill performances can be videotaped and can be later evaluated by the teacher. Alternatively, students can evaluate their own performance and learn about the correct application of the motor skill. An extension of the videotaped performance can involve the use of electronic portfolios to provide an overview of students' progress. An electronic portfolio can include video clips of student performance with perhaps analysis, fitness and motor skill scores, illustrations of activity levels over months, essays, journals and dietary logs, or other physical education assignments, among other things. These student portfolios can be indexed on the computer, saved in a diskette format or can be sent electronically to the students and their parents. Indeed, the combination of video and computer technology portends great things for physical education assessment. However, in Singapore, this approach of physical education assessment has not yet been exploited. In the current millennium, it is not inconceivable that the use of ICT becomes more pervasive and permeates to all levels of physical education in the schools. As Singapore schools focus less on an examination-oriented curriculum and place greater emphasis on project work, the use of student portfolios in physical education that is aided by the use of ICT may become the norm. ICT will assist with instruction by providing demonstrations and interactive learning activities, monitoring physical activity and fitness activities of young people, and providing useful feedback for teachers to improve their lessons, on demand. All instruction and assessment will be integrated with the automatic recording of data and quick provision of feedback.
ICT use in continual training and professional development of teachers

In a culture of lifelong learning, continual training and professional development of teachers will be the norm. As teachers juggle work in school with professional development, the use of ICT in web-based learning will become indispensable. In this respect, the National Institute of Education is taking proactive steps in launching some in-service courses on the web. The Institute is currently engaged in training staff to be conversant with certain software such as BlackBoard CourseInfo which can help facilitate the process. BlackBoard CourseInfo is an on-line delivery tool for teaching and learning. The software allows course instructors to build and manage their own on-line teaching and learning environment. Instructors can place Word documents, PowerPoint presentations, Excel files, graphic files, video/audio clips or create links to other web sites. Communication between instructors and learners is facilitated through e-mail, forum facilities and virtual chat rooms. Instructors can also conduct online quizzes and surveys, provide appropriate feedback and also monitor the progress of learners. Although on-site teacher training of physical education at the Institute of Education will continue to be important, the use of ICT in continual training in physical education, where teachers can be physically off-campus, will be brought to the forefront in the not too distant future.

Special Resources for the Physical Education Teacher

Many resources for physical education are available on the World Wide Web, albeit, at the present time, the majority of these physical education resources are hosted overseas. Physical education teachers who are interested in generic education resources can access AskERIC (URL:http://ericir.syr.edu/). This site has organized compilations of frequently asked questions by teachers and parents and also includes research-based answers. The use of the World Wide Web, Listservs¹ and electronic mail has resulted in many virtual discussions among professionals in physical education. Three Physical Education Listservs have been identified at the present time and they have increased communications among physical education professionals. The USPE-L, hosted by Virginia Tech University, for example, is directed to physical education teachers and teacher educators. It currently has more

¹A Listserv provides the opportunity for individuals with common interests to communicate via e-mail. With this facility, professors, mentors, teachers and trainee-teachers can use e-mail as a forum for exchange of information and discussion.
than 500 members and the sharing and goodwill evidenced on this Listserv are impressive. Typically, the Listserv ‘takes on a life of its own’ with teachers asking for suggestions and others responding with a variety of solutions. Some recent topics have included co-educational versus single sex physical education, uses and minimum technology skills for physical education and activities for beginning physical education teachers to establish management procedures and providing a rationale to support PE to school boards. Another Listserv is hosted by the University of Illinois and is called PHYSED-L. This Listserv is primarily directed at pedagogy researchers and includes graduate students and university faculty members in five continents (Silverman, 1997). The AUSTPE-L is a similar list for physical education teachers in Australia. Singapore currently does not have a Listserv for physical education teachers but the author is actively exploring the possibility of hosting one, and negotiations with the Ministry of Education on the best way forward for having a Singapore Physical Education-Listserv (SPE-L) are in progress. Another possibility is to have the Singapore Physical Education Association (SPEA), which has its own web site to host the Listserv.

One of the most exciting events for physical education and the Web was the launch of PE Central by George Graham and his team of graduate students in August 1996. To date, PE Central has achieved 22,000 pages of content material and continues to grow. The PE Central project (URL: http://pe.central.vt.edu) has demonstrated the ability of the team to combine their knowledge of physical education with the use of ICT for the benefit of many. The PE Central project has too many resources to report here. It includes assessment ideas, lesson plans, equipment information, job information and also provides links to many other useful physical activity web sites. According to PE Central’s statistics for August 1999, Singapore ranked 10th in the world in terms of the volume of hits that the site received. Teachers looking for resources on the Web for physical education should start with PE Central. Physical education teachers who are interested in health-related aspects of physical education can also find useful information from Project SPARK, URL: http://www.foundation.sdsu.edu/projects/spark/index/html), a research-based evaluation of health-related physical education that is hosted by San Diego State University.

Pitfalls of the Use of ICT in Physical Education

It is important to adopt a balanced view of the use of ICT in physical education. It is appropriate and important to acknowledge that ICT will
not be a panacea for physical education. Some of the potential pitfalls in the use of ICT in physical education will now be examined.

**Gap between the 'haves' and 'have-nots'**

Like many of the experiences in any society, there will always be a tension between the 'haves' and the 'have-nots'. In Singapore, some schools are in Phase 1\(^2\) of the IT Master Plan while others are still in Phase 3\(^3\), with the rest of the schools placed somewhere in-between. Also there is usually a lag in time between the availability of ICT in the schools and the appropriate use and application of the available technology in teaching and learning. If there is a disproportionate distribution of 'knowledge-based' know-how in schools, where only some students have access to ICT in indoor facilities and classrooms, then the knowledge gap between the 'haves' and the 'have-nots' will remain and will not be ameliorated. As Singapore's educational knowledge-based programmes shift into high gear to mirror the society's inclination towards a knowledge-based economy, policy makers, school administrators, physical education teachers and parents will need to pay special attention to the distribution of technology to all students in school, at community clubs, public libraries, public centres of learning and even at home.

**Does the use of ICT result in the aims of physical education being achieved?**

Physical education teachers who are actively engaged in, or are contemplating using ICT in the teaching and learning of physical education, must consider the impact of the technology on the physical activity levels and physical fitness of young people. One must never forget that physical education is in essence education through the physical. It seems likely that some uses of ICT would indeed depress the levels of physical activity of young people and that could have a deleterious effect on their health and physical fitness in the long term, if no intervention is made. The users of ICT in physical education will need to appraise if the technology enhances or inhibits skilled, healthy, and enjoyable physical activity. ICT probably represents another powerful tool that has the potential to enrich students' learning and improve teaching if it is used appropriately. However, it is but one of many tools and it should be perceived as such. The use of ICT must

\(^2\) Phase 1 is a classification for 'ICT-pervasive'.

\(^3\) Phase 3 is a classification for 'not yet ICT-pervasive'.
not take away the core business of physical education which is mainly psychomotor. We must be mindful that it is possible for the ICT to be inventive and interesting but if it does not serve the purpose of physical education, then it is a wasteful use of the technology. A group of researchers from the Physical Education and Sports Science Academic Group of the National Institute Education and the Ministry of Education are currently involved in a three-year pilot study that examines the impact of ICT on the habitual physical activity and physical fitness of primary and secondary pupils in Singapore.

**Is the use of ICT the best way to teach, learn and practise physical education?**

Unfortunately, many of the available physical educational software are still at the drill and practise stage and are not very captivating. There is a real danger that a dynamic and effective physical education teacher may be substituted with a less effective and interesting video or computer application. Consequently, students may not otherwise acquire the enthusiasm for physical activity that they may get through an effective physical education teacher. When good sports software are available, there is always the danger that students may derive gratification from playing cyber-games on a computer terminal too easily. Consequently they may forego learning the game on court, or on the field, where with skill mastery of the game, there is the promise of delayed gratification. The health benefits that can accrue from actual physical activity in learning the game or sport, are therefore 'virtually' squandered away. Perhaps the best way forward is to combine traditional approaches to teaching physical education with the appropriate use of ICT. For that to occur, the physical education teacher must be ICT-literate and be able to make an informed decision as to how best to employ ICT in a physical education setting. The use of ICT in physical education in Singapore is still very much in its infancy stage. Consequently, there are no current research data as to the efficacy of the use of ICT in physical education. This area awaits future research attention.

**The physical education teacher educator**

Perhaps the most challenging hurdle to the use of ICT in physical education is the teacher educator. Very often, young people and physical education trainee teachers have more advanced computer and technological skills than the teachers or professors teaching them. Moreover, many faculty members do not yet model the use of ICT when teaching their classes. For instance in a recent informal poll of faculty
members teaching physical education at the university, less than 50% use ICT in the delivery of their lectures. The percentage is even smaller where the lessons are practical in nature. The use of ICT must be integrated into teacher training if future teachers of physical education are going to employ it in their own lessons. In turn, teachers must also be technologically literate and want to use ICT in their teaching of physical education where it is deemed appropriate and useful. As ICT become user-friendlier and even more accessible to all, the problem may resolve itself but both teachers and teacher educators must learn how to use the technology if it is to be integrated in physical education.

CONCLUSION

The use of ICT in physical education has not received much academic attention despite the launch of the IT Master Plan for Education in Singapore in 1997. As the use of ICT in all curriculum subjects including physical education becomes even more pervasive, it is important for physical education teachers to be reflective and thinking users of the technology. That is, teachers must be mindful that ICT may simply provide a positive means to a negative end. It is conceivable that with the use of ICT, students may have greater access and control over information and know more about sports, health and exercise. It is, however, equally conceivable that the proliferation of such technology may continue to encourage even more pronounced levels of inactivity among young people. This may inadvertently devalue physical activity and the place of physical education in the school. Research data on the impact of ICT use in physical education are warranted to help answer some of the pertinent questions raised by professionals who are interested in the welfare and good health of our young people. The future health of this nation may well depend on it. The question as to whether the ICT-physical education nexus is a marriage of convenience, or partners for life, is a question that remains unanswered. Like all marriages of sorts, only time will tell. The epic journey has only just begun.

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