2000 International Conference for Physical Educators (ICPE 2000)

Innovation and Application of Physical Education and Sports Science in the New Millennium - An Asia-Pacific Perspective

Editors  Ming-Kai Chin
          Larry D. Hensley
          Yuk-Kwong Liu
Innovation and Application of Physical Education and Sports Science in the New Millennium
- An Asia-Pacific Perspective

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Contents

Perface xi

Keynote Addresses

1 Developmentally Appropriate Practice for Fundamental Movement Skill Learning
   David L. Gallahue ........................................ 3-19

2 Connections Between Physical Education and Sports Science in the New
   Millennium: A Bridge Too Far?
   Ming-Kai Chin and Herbert Haag ....................... 21-34

3 Physical Fitness, Physical Activity and Physical Education
   Neil Armstrong ........................................... 35-43

4 Studying Teaching Effectiveness in Physical Education, Research Designs
   and Findings
   Maurice Piéron ........................................... 45-60

5 Nutritional Status, Problems and Strategies of Chinese Students
   Ji-De Chen ............................................. 61-71

Invited Papers

6 A Universal Approach in Action: Philosophy and Physical Education
   Peter Chen ............................................. 75-88

7 Comprehensive School Health Model: An Integrated School Health Education and
   Physical Education Program
   Mohammad R. Torabi and Jing-Zhen Yang ................ 89-104

8 Reconsidering the Teaching Games for Understanding Model from a Situated
   Learning Perspective
   David Kirk and Ann MacPhail ............................ 105-116

9 Body Composition: An Update on Older and Current Technology
   Robert Girandola and Ming-Kai Chin ..................... 117-122

Conference Papers on International Physical Education, Sports
and Sports Science

10 Globalisation of Physical Education and Sports Science
    Gudrun Doll-Tepper ..................................... 125-130
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors/Contributors</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Recent Trends in Physical Education in the United States</td>
<td>Ronald S. Feingold</td>
<td>131-136</td>
</tr>
<tr>
<td>12</td>
<td>&quot;Sports Science Education&quot; in Nagano Olympic Games: Aim and Concept</td>
<td>Kazuhiko Watanabe</td>
<td>137-144</td>
</tr>
<tr>
<td>13</td>
<td>Physical Education Teacher Preparation in Singapore: Past History,</td>
<td>Sock Miang Teo-Koh</td>
<td>145-150</td>
</tr>
<tr>
<td></td>
<td>Present Realities, Future Challenges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Sport as a Curriculum Innovation in Singapore</td>
<td>Michael C. McNeill, Len Almond, and Peter A. Horton</td>
<td>151-166</td>
</tr>
<tr>
<td>15</td>
<td>Organised Sport: Participation and Experiences of Children</td>
<td>Kristine De Martelaer, Paul De Knop, Lies Van Heddeghem, and Marc Theebboom</td>
<td>167-174</td>
</tr>
<tr>
<td>16</td>
<td>Asian Martial Arts in Western Physical Education</td>
<td>Marc Theebboom and Paul De Knop</td>
<td>175-183</td>
</tr>
<tr>
<td>17</td>
<td>Effects of Community Sport Participation on Adolescent Emotional</td>
<td>Hye-Jung Park</td>
<td>185-189</td>
</tr>
<tr>
<td></td>
<td>Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Conference Papers on Teaching of Physical Education and Sports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Alternative Assessment in Physical Education: &quot;A Double-Edged Sword&quot;</td>
<td>Larry D. Hensley</td>
<td>193-202</td>
</tr>
<tr>
<td>20</td>
<td>Teaching Games for Understanding: Basketball Teachers' Responses</td>
<td>Yuk-Kwong Liu</td>
<td>203-210</td>
</tr>
<tr>
<td></td>
<td>After Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>in the Schools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Improving Student Teaching Experience in Physical Education: An</td>
<td>Wen-Hao Liu and Jepkorir R. C. Thomson</td>
<td>221-228</td>
</tr>
<tr>
<td></td>
<td>Analysis of Pre-service Teachers' Perspective About Student Teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Field-Dependent Students in Physical Education: Their Limitations and</td>
<td>Wen-Hao Liu and Gang-Yan Si</td>
<td>237-247</td>
</tr>
<tr>
<td></td>
<td>the Solution Thereof</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Development of Tennis Sport Clinic Program for the Effective Tennis</td>
<td>Tae-Soop Park</td>
<td>249-256</td>
</tr>
<tr>
<td></td>
<td>Teaching</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conference Papers on Application of Sports Science in Physical Education and Sports

25 The Effect of Active and Passive Selection of Performance Goals on the Performance Reproduction of a Motor Skill
John Liu, Dee A. Brown, Hugh K. McCauley, and Shi-Hui Chen .......................... 259-266

26 Children's Learning of Motor Skills: The Acquisition and Development of Error-Detection Capability and Instructional Considerations
John Liu, Shi-Hui Chen, and Jia-Boi Zhang .................................................. 267-275

27 Promoting Developmental Assets: A Potential Model for Physical Education
Donali G. DeGraaf and Jason W. K. Lau ...................................................... 277-296

28 Effects of 'Agromas'® Herbal Drink on Physiological Responses and Cycling Performance in Young Cyclists
Fonom-Kiew Ooi ................................................................. 297-309

29 The Use of Imagery by Table Tennis Players
Charlie L. Nix and Shu-Chung Wu .......................................................... 311-317

30 Physical Education Teachers' Perception of Pupils' Motivation
Marc Cloes, Maryse Ledent, Catherine Delfosse, and Maurice Piéron ............. 319-328

31 Coaches' Thinking Process: Analysis of Decisions Related to Tactics During Team Sport Games
Marc Cloes, Krystel Bavser, and Maurice Piéron ........................................ 329-341

32 A New Measure of Precompetition Confidence and Anxiety: Precompetition Emotion Scale - T(PES-T)
Li-Wei Zhang and Mai-Jiu Tian ................................................................. 343-371

33 Testing Ajzen's Theory of Planned Behavior on the Physical Activity Participatory Behavior of Hong Kong Children and Youth: A Pilot Study
Chi-Kin Chow and Koenvourd J. Lindner .................................................. 373-386

34 Indicators on Talent Identification in Today's Multicultural Society in Sweden
Rolf Carlson .................................................................................. 387-393

35 The Effect of an Age Specific Rugby Development Programme on the Skills Performance of Talented Youth Players
Emanuel J. Spamer and Eugene Hare ....................................................... 395-405

36 Changes in Hematological and Health-Related Fitness Variables of Rehabilitated Male Drug Addicts Following Structured Exercise Programme
Grace O. Ohimwa ........................................................................ 407-414

37 Effect of Exercise During Dialysis on Urea Clearance
Raymond W. Leung ................................................................... 415-428
The Effects of Home-Based and Group Exercise in Coronary Artery Disease Patients
Hyuck-Jong Lee, Mi-Ok Kang, Un-Kyung Park, Hye-Jung Choi, Young-Soo Jin, Tae-Won Jun and Sung-Jung Park .............................................. 429-433

Kinesiological Analysis of a Criterion-Referenced Test for Fundamental Movement Skills of Piroette
Hyang-Soo Chung .................................................................................. 435-439

Conference Papers on Health-Related Fitness in Physical Education

Injuries in Physical Education Activities Among College Students of Baquio City (Philippines)
Mario G. Imson and Lennie C. Morron .................................................. 443-452

Integrate Mental Health Benefits into Physical Education Curriculum
Sean X. Cai ............................................................................................ 453-460

A Link between Health Promoting Behaviors and the Selected Psychological Factors in Adolescence
Sung-Gu Kang, Young-Soo Kim, Joo-Young Park, and Bong-Ju Seong .......... 461-470

Validation of the Rockport Fitness Walking Test as a Method of Estimating \( V_{O2}\text{max} \) on Malaysian Students
Chee-Keong Chen, David Williams, and Martin Sellens ............................ 471-485

Cross-Validation of Bioelectrical Impedance Analysis for Estimation of Body Fat in Chinese Children Age 8 to 12
Sai-Chuen Hui, Heng-Yong Wong, Wing-Chung Lau, and Wing-Kin Wong ..... 487-492

Evaluation of Three Physical Activity Questionnaires in Predicting Cardiovascular Fitness of Chinese Children
Wan-Sze Chan and Sai-Chuen Hui ............................................................. 493-500

Conference Papers on Adapted Physical Education

Application of the Time Delay Strategy in Teaching Gross Motor Skills to Individuals with Disabilities
Shi-Hui Chen, Jia-Be Zhang, John Liu, and Yong-Tai Wang ....................... 503-512

Effect of a Movement Therapy Program for Developing a Mental Retarded Child's Intrinsic Creativity
Na-Jung Kim ........................................................................................... 513-518

Learning Effects of IEP Team Models for Cognitive and Motor Abilities of Mental Retarded
Kyung-Ho Chang .................................................................................. 519-524

Handicapped Students' Integration with Normal Peers in Adapted Physical Education Programs
Sung-Soo Han .......................................................................................... 525-531
Preface

The 2000 International Conference for Physical Educators (ICPE 2000) from 7-8 July 2000 was attended by 650 international and local participants. We had an overwhelming mixture from 270 institutions, government departments and schools from 15 countries plus the Asia-Pacific Region. ICPE 2000 was organized by the Department of Physical Education and Sports Science (PESS); School of Creative Arts, Sciences and Technology (SCAST) and Centre for Research and International Collaboration (CRIC) of The Hong Kong Institute of Education (HKIEd). The theme was "Innovation and Application of Physical Education and Sports Science in the New Millennium – An Asia-Pacific Perspective". During this conference, the directions of physical education were examined and innovative ways of teaching with the support of scientific knowledge were proposed and discussed. Six keynote addresses and 4 invited papers, together with 31 free papers and 190 poster presentations in both English and Chinese were very well received.

Mr. Yang Guiren, Director General, Department of Physical Education, Health and Art Education, Ministry of Education, P.R. China came with a large delegation of 248 scholars and teachers from 119 institutions and schools of 23 provinces from China to show his support. The gracious presence of Prof. Dr. Oudrun Doll-Tepper, President of International Council of Sports Sciences and Physical Education (ICSSPE), and Prof. Dr. Ronald S. Feingold, President of International Association for Physical Education in Higher Education (AIESEP), made ICPE 2000 a truly global event.

This was the largest international conference for physical educators held in Hong Kong and we believe ICPE 2000 provided opportunities for physical educators, scholars, researchers, administrators, and sports scientists from the Asia-Pacific Region to interact and share research findings in an effort to meet the needs of the 21st century.

The proceedings of ICPE 2000 consists of the scholarly work presented during the keynote addresses and invited papers, free paper sessions, and poster presentations. The 49 selected papers have been organized into 5 sections, beginning with the keynote addresses and invited papers. It was followed by 40 papers in the areas of international physical education, sports and sports science, teaching of physical education and sports, application of sports science in physical education and sports, health-related fitness in physical education, and adapted physical education.

The success of ICPE 2000 and the publication of these proceedings would not have been possible without the financial and resource support from The Hong Kong Institute of Education. Our special thanks to the encouragement of Prof. Ruth Hayhole, Director; Prof. Stuart Richmond, Dean (SCAST); and Prof. Cheng Yin Cheong, Centre Director (CRIC), HKIEd.

We sincerely hope the papers in this book of proceedings of ICPE 2000 will contribute to the further development of physical education and sports science.

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KEYNOTE ADDRESSES
Developmentally Appropriate Practice for Fundamental Movement Skill Learning

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Abstract

This paper presents the essential tools for helping children become skillful movers. First, Developmental Physical Education is defined, followed by a brief discussion of the Categories of Movement. We then examine what is known about the Phases and Stages of Motor Development and How Movement Skills are learned. Then we take a brief look at The Teachers Role in Motor Development and Movement Skill Learning. Finally, we discuss the topic of Assessing Progress the standpoint of observing children's fundamental movement behavior, and make suggestions for using this important information in Teacher Behavior and curriculum development.

For children, movement is at the very center of their lives. Movement influences and is influenced by all facets of development, including the motor, cognitive and affective domains of human behavior. To deny children the opportunity to reap the many benefits of regular vigorous physical activity is to deny them the opportunity to experience the joy of efficient movement, the health benefits of vigorous physical activity, and a lifetime as confident, competent movers. No matter what the activity one cannot take part successfully if the essential fundamental movement skills contained within a movement activity have not been mastered. Historically, however, the assumption by many has been that children somehow automatically develop their movement skills, primarily as a result of maturation. Therefore, the portion of the day spent in vigorous physical activity has often been viewed as free play, recess, or at best a time for children to blow off steam.

The assumption that mature fundamental movement skills will develop on their own is not valid (Gallahue & Ozmun, 2001; Roberton & Halverson, 1984; Seefeldt, 1986). It is now widely recognized that a variety of environmental factors play a key role in movement skill acquisition and that children need frequent practice opportunities, encouragement, and instruction in order to master the fundamental movement skills of childhood such as running, jumping, throwing, catching, and balancing. Developmentally based physical activity experiences implemented by knowledgeable and caring adults, are essential for children to develop their fundamental movement skills.

This paper presents the essential tools for helping children become skillful movers. First, Developmental Physical Education is defined, followed by a brief discussion of the Categories of Movement. We then examine what is known about the Phases and Stages of Motor Development and Movement Skill Learning. Then we take a brief look at The Teachers Role in Motor Development and Movement Skill Learning. Finally, we discuss...
the topic of Assessing Progress the standpoint of observing children’s fundamental movement behavior, and make suggestions for using this important information in Teacher Behavior and curriculum development.

DEVELOPMENTAL PHYSICAL EDUCATION: DEFINED

The overarching purpose of developmental physical education is to help children become literate movers by learning-to-move and learning-through-movement. Broadly defined, the concept of literacy may be extended to include the four curricular goals of developmental physical education: movement literacy and fitness literacy (learning-to-move), as well as cognitive literacy and affective literacy (learning-through-movement).

Developmental physical education uses a wide variety of appropriate practices to promote movement skill acquisition and increased physical competence. In addition, developmental physical education recognizes and incorporates the many and varied contributions that developmental teaching makes to both the cognitive learning, and affective development of children. Developmental physical education encourages the uniqueness of the individual, and is based on the fundamental proposition that although motor development is age-related, it is not age-dependent. As a result, teacher decisions concerning what to teach, when to teach it, and how to teach are based primarily on the concept of individual appropriateness, and secondarily on the concept of age appropriateness. Table 1 outlines the essential elements of developmentally appropriate physical education (Gallahue & Cleland, 2001).

Table 1: Essential Elements of Developmentally Appropriate Physical Education*

<table>
<thead>
<tr>
<th>Developmentally appropriate physical education must:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Focus on the individual appropriateness of developmental movement experiences</td>
</tr>
<tr>
<td>• Use age-group appropriateness as a general guideline for activity selection</td>
</tr>
<tr>
<td>• Incorporate learning mediums that are both fun and relevant to the needs and interests of the children being served</td>
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<tr>
<td>• Promote inclusion and cooperation, rather than exclusion and competition</td>
</tr>
<tr>
<td>• Emphasize moving and learning, rather than sitting, waiting and watching</td>
</tr>
<tr>
<td>• Promote individual standards of success and achievement, and minimize failure</td>
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<tr>
<td>• Recognize that young children are not miniature adults, adolescents, or older children, but have unique and differing needs, interests and developmental capabilities</td>
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</tbody>
</table>

*Adapted from: Gallahue & Cleland, (2001). Developmental Physical Education for Today’s Children

The Movement and Fitness Literacy Goals (Learning to Move)

The learning-to-move aim of developmental physical education is based on the recognition that its primary contributions lie in the unique goals of movement literacy and fitness literacy. As such the movement skill objectives of the developmental program center on helping children become skillful movers, knowledgeable movers, and expressive movers in a wide variety of fundamental and specialized movement skills. The fitness enhancement goal of developmental physical education is expressed in the objectives of helping children become fit movers, informed movers, and eager movers through promotion of an active way of life.
For example, young children become *skilled movers* as they learn to move with control and efficiency in the performance of their fundamental movement skills. Learning how to run and leap, throw and catch, and balance and roll helps provide them with the basic movement skills essential for an active lifestyle. So too, they become knowledgeable movers as they learn more about how their body can move and how it should move. Knowing the many and varied ways that their body can move through space, and the essential elements of how it should move when they jump rope or play hopscotch provides them with important knowledge for further movement skill acquisition and refinement. Through movement they also become expressive movers. Expressive movers are capable of moving creatively, and of appreciating the beauty of movement in themselves and others. Such appreciation is self-motivating, promotes active involvement, and fosters a need for creative movement expression.

Additionally, when children achieve the goal of movement skill acquisition they are also becoming fit movers. *Fit movers* maintain a personal level of physical fitness, and enjoy the many positive health benefits of vigorous physical activity. Fit movers also need to be informed movers who learn about essential fitness concepts and sound principles for gaining and maintaining a personal level of fitness. Such knowledge provides them with the keys to a lifetime of fitness education. Through quality physical education experiences children maintain their natural zest for being eager movers. As a result, they are self-motivated to engage in positive fitness behaviors as part of a personally chosen active way of life.

**The Cognitive and Affective Literacy Goals (Moving to Learn)**

The moving to learn aim of developmental physical education is based on the realization that, through good teaching, movement can make significant contributions to other areas of development and learning, especially cognitive and affective literacy. Cognitive learning can be aided by helping children achieve the important objectives of being *multi-sensory learners* and *active learners*. Similarly, affective development is enhanced by helping children become *self-discovering learners* and *cooperative learnings*. For example, children maximize their effectiveness as multi-sensory learners when they use their tactile and kinesthetic senses as avenues for learning, in addition to the more commonly used visual and auditory modes of the classroom. Because they are naturally active learners, children use physical activity effectively to gather and apply information about their ever expanding world. Children's skill as active learners needs to be recognized and nurtured through learning media that both permit and promote physical activity.

Children become self-discovering learners, building self-confidence and enhancing self-esteem, as they increase their movement competence through play, games, and vigorous physical activity. Additionally, developmental movement experiences help them become cooperative learners as they learn how to share equipment, take turns, and play fair. Figure 1 provides an overview of the aims, goals and objectives of developmental physical education.
THE CATEGORIES OF MOVEMENT

Movement skills may be subdivided into categories. A category of movement is a classification scheme based on common underlying components. As used here, the terms locomotion, manipulation, and stability represent these underlying components. These three categories, and resulting movement phrases, serve as the organizing centers for the movement skill themes of the developmental physical education curriculum (Figure 2).
Figure 2: The Categories of Movement and Sample Movement Skill Themes of the Developmental Physical Education Curriculum

**Selected Fundamental Movement Skill Themes**

<table>
<thead>
<tr>
<th>Locomotion</th>
<th>Manipulation</th>
<th>Stability</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. Running</td>
<td>b. Kicking</td>
<td>b. Stretching</td>
</tr>
<tr>
<td>c. Leaping</td>
<td>c. Punting</td>
<td>c. Twisting</td>
</tr>
<tr>
<td>d. Jumping</td>
<td>d. Striking</td>
<td>d. Turning</td>
</tr>
<tr>
<td>e. Hopping</td>
<td>e. Volleying</td>
<td>e. Swinging</td>
</tr>
<tr>
<td></td>
<td>f. Bouncing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>g. Rolling</td>
<td></td>
</tr>
<tr>
<td>2. Combinations (two or more elements):</td>
<td>2. Absorptive:</td>
<td>2. Static and Dynamic Postures</td>
</tr>
<tr>
<td>b. Sliding</td>
<td>b. Trapping</td>
<td>b. Inverted balances</td>
</tr>
<tr>
<td>c. Skipping</td>
<td></td>
<td>c. Rolling</td>
</tr>
<tr>
<td>d. Climbing</td>
<td></td>
<td>d. Starting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Stopping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>f. Dodging</td>
</tr>
</tbody>
</table>

Locomotor movements are those in which the body is transported in a horizontal or vertical direction from one point in space to another. Running, jumping, hopping, leaping, and skipping are all fundamental locomotor movements.

Gross motor manipulative movements are vigorous movements that involve giving force to objects or receiving force from objects. Throwing, catching, kicking, trapping, and striking are fundamental gross motor manipulative skills.

Fine motor manipulative movements involve object handling activities that emphasize motor control, precision and accuracy of movement. Tying shoes, coloring, and cutting with scissors are all fundamental fine motor manipulative skills.

Stability movements are those in which the body remains in place but moves around its horizontal or vertical axes. In addition, they are also dynamic balance tasks in which a premium is placed on gaining or maintaining balance in relationship to the force of gravity. A forward roll and dodging a ball are both considered to be stability abilities because of the strong emphasis placed on maintaining equilibrium throughout the task. Axial movements such as reaching, twisting, turning, bending, and stretching are also fundamental stability abilities, along with lifting, carrying, pushing, and pulling.

Movement phrases are combinations of locomotor, manipulative, and/or stability movements. Movement phrases are introduced only after children have mastered the basic
elements of a single fundamental movement skill. For example, rather than being content with jumping off a box and landing in a bent-knee position, children now want to jump off, land, and do a forward roll. Or they may want to jump with a half turn followed by a backward roll. As skill develops these movement phrases become longer, more complex, and more refined.

**PHASES AND STAGES OF MOTOR DEVELOPMENT**

Motor development has been described as occurring phases and stages (Gallahue & Cleland, 2001; Gallahue & Ozman, 2001). During the period of infancy, children pass through the reflexive movement phase and the rudimentary movement phase. The period ranging from about two to seven years of age is generally considered to be the fundamental movement phase, the ideal time for children to master basic locomotor, manipulative, and stability skills. These movement skills develop along a continuum of stages within this phase, progressing from the initial to the elementary to the mature stage. During later childhood and adolescence children are typically at the specialized movement phase of development. Figure 3 provides a visual representation of the phases and stages of motor development. Our discussion here, however, focuses on the initial, elementary and mature stages within the fundamental movement phase.

*Figure 3: The Phases and Stages of Motor Development*


8
Initial Stage

At the initial stage of developing a fundamental movement skill, children make their first observable and purposeful attempts at performing the task. Two and three year olds are typically seen to function at the initial stage which is characterized by relatively crude, uncoordinated movements. Valid attempts at throwing, catching, kicking, jumping, and so forth are made, but major components of the mature pattern are missing. Movements are either grossly exaggerated or inhibited and rhythmically coordinated execution of the movement is also absent. Teachers of children at the initial stage need to recognize that this is a legitimate stage of development and that the normal vigorous indoor and outdoor play experiences of childhood will do much to help young children progress to the elementary stage.

Elementary Stage

The elementary stage of fundamental movement skill development is typical of the performance of four and five year olds. Like the initial stage, the elementary stage of motor development appears to be primarily dependent upon maturation. It is a transitional period between the initial and mature stages, in which coordination and rhythmical performance improve, and children gain greater control over their movements. However, movements at this stage still appear somewhat awkward and lacking in fluidity. Many adults are only at the elementary stage in such basic activities as throwing, striking, and catching; they progressed to this stage primarily through maturation but failed to achieve the mature stage because of inadequate environmental conditions.

Teachers of preschool and primary grade children who are at the elementary stage need to provide ample encouragement and opportunities for practice. A well designed play environment with plenty of equipment and interested adults to stimulate locomotor, manipulative, and stability skill development will do much to provide the conditions so vitally needed; equally important at this stage is the need for quality instruction. Teachers need to be actively involved in helping children learn. By challenging them through teaching approaches that involve movement exploration and guided discovery experiences, as well as more direct teaching techniques, children can progress from the elementary to the mature stage.

Mature Stage

Children generally have the developmental potential to be at the mature stage in most fundamental movement skills by age six or seven (the exception being manipulative skills that involve object tracking, such as catching, and striking a pitched ball. But, because of the strong environmental basis for mature movement skill acquisition, many children are delayed in their attainment, or miss out all together. The mature stage of fundamental movement skill development is characterized by integration of all the component parts of a pattern of movement into a well-coordinated, mechanically correct, efficient act. From this stage, performance improves rapidly. Children are, for example, able to throw farther, run faster, and jump higher after the mature stage has been attained. A mature fundamental skill maybe continually refined, combined with other movement skills, and used in a variety of sport and recreational activities.
Children reach the mature stage at varying rates. Some may be delayed; others may be advanced and reach this stage more rapidly. If development is delayed over a period of years, certain skills may never be attained in their mature form without considerable extra effort.

Teachers of children at the mature stage need to focus more on the product of the child's performance than on the process. Emphasis should now begin to be placed on qualitative standards of how far, how fast, or how many. Mature fundamental movement skills form the basis for the specialized movement skills so important to successful participation in the sport and recreational activities of our culture.

**HOW MOVEMENT SKILLS ARE LEARNED**

One definition of learning is that it is a permanent change in behavior. Movement skill learning, therefore, may be defined as permanent change in motor behavior resulting in improved movement performance. The actual "learning" of a new movement skill is an internal process that can only be observed indirectly through the product of one's movement. Unfortunately, movement skill learning is sometimes viewed simply as the product of some form of activity designed to improve children's motor performance, with little attention given to the processes involved. Such a view is incomplete and limited in scope. All learning is a process that occurs within the individual through the reconstruction of incorrect mastery attempts. As one moves from an uncoordinated and poorly controlled movement to highly refined, coordinated and controlled performance the "process" of learning is occurring, which eventual results in the finished "product," the movement performance.

Learning a new movement skill involves a hierarchial process. This sequential progression in learning a new movement skill has been classified into broad levels and substages (Gallahue & Cleland, 2001; Gallahue & Ozmun, 2001; Magill, 2001). Each level (Beginning, Intermediate and Advanced) and stage Awareness, Exploration, Discovery, Combination, Application, Performance and Individualization) refers to a period during which the learner displays certain characteristics, and the teacher has specific responsibilities in order to maximize learning. Figure 4 provides a visual representation of these levels and their corresponding stages.
Figure 4: The Levels and Stages of Learning a New Movement Skill


The process of learning a new movement skill is the age independent learner. Both children and adults go through the same processes when learning a new movement skill, whether learning how to successfully ride a bicycle or drive a car. For example, when learning to ride a bicycle, children first develop a general awareness of what is involved in the process of bicycle riding. Then, through exploration, they experiment with the essential elements of balancing, pedaling, and steering. Soon through systematic inquiry, they discover how to successfully ride the bicycle. Gradually they become more adept in the utilization of their newly learned bicycling skills. Through continued practice, performance improves and bicycling skill become more refined. Soon these skills are applied to a variety of settings and terrains with ease. With further effort, skillful young bicycle riders become capable of precise performances on hills, around corners, through obstacle courses and mazes on the playground. They are now capable of individualizing and personalizing bicycle riding performance to their individual needs and interests as they utilize their highly developed skills for both fun and fitness.
Beginning/Novice Level

The beginning, or novice, level of learning a new movement skill is a precontrol level in which the child is trying to get a general idea of the requirements of the movement task. There is considerable variability in performance with lots of gross errors. At this level performing the movement is a conscious cognitive process where attention is paid to each detail of the task, without regard to their relative importance. Movement control and coordination is lacking and the learner frequently becomes easily fatigued because of the mental requirements of the task. Teachers of children at the beginning level of learning a new movement skill need to be aware of the conscious cognitive requirements of this level and understand that the intent is only to provide the learner with the general idea of the skill or activity.

**Awareness Stage.** Awareness is the first stage of learning a new movement skill. First the individual must have a conscious mental picture of the movement pattern itself and the general requirements of the task. At the awareness stage the child, for example, when learning how to “throw” a ball, must first be aware of what the word “throw” means. She then needs to be aware of what type of throw is desired - overhand, underhand, or sidearm. Only when the learner is able to match the verbal name attached to the desired movement does she become aware of what the task is and what its general requirements are.

**Exploratory Stage.** Exploration is the second stage within the beginning/novice level. At this stage the child develops awareness of the general characteristics of the movement task, and begins to experiment with it in relative isolation from other movement skills. At the exploratory stage of learning how to throw a ball, for example, movement control is lacking, but a conscious mental plan is being formed, and the learner is getting the general idea of what is required for a successful throw. Movement exploration techniques that permit the child to experiment with the many and varied ways of throwing a ball are especially beneficial in helping the child get a general idea of how the body can move in the performance of the task.

**Discovery Stage.** At the discovery stage of learning a new movement skill the child begins to find more efficient ways and means of performing the task. In terms of ball throwing, movement control and coordination begins to improve and becomes less consciously controlled. Guided discovery and problem-solving techniques are helpful at this stage for children to sort out the important from the unimportant in beginning to coordinate and control how the body should move in the performance of the overhand throwing pattern.

Intermediate/Practice Level

The intermediate, or practice, level of learning a new movement skill begins after obtaining the general idea of the skill and being able to perform it in a manner approximating the final skill. The learner at this level has a better understanding of the skill, and a mental plan becomes more fully developed. There is sufficient knowledge of both how the body can move and how it should move in the performance of the task, but consistency is still lacking. The skill at this level has utility and is practiced repeatedly. Conscious attention to the elements of the task diminishes. More attention is now devoted to the goal or product of the skill than to the process itself. The poorly coordinated, jerky movements so evident at the beginning level disappear. The learner gains a "feel" for the
skill as kinesthetic sensitivity becomes more highly attuned. As a result, there is less reliance on verbal and visual cues and greater reliance on muscle sense.

**Combination Stage.** At the combination stage of learning a new movement skill the child begins to join the actions of one movement skill with those of other movement skills. This is a practice stage where the new movement skill is combined and integrated with other previously learned skills, and practiced repeatedly in the child's first attempts to utilize it in some activity form such as a game, rhythm or self-testing activity. For example, the child can now perform the overhand throw from a variety of positions instead of relying only on the classic overhand throwing preparatory stance. At the combination stage the child learns to throw on the run, or to bend over and recover a ground ball immediately prior to throwing the ball to a partner.

**Application Stage.** Upon reaching the application stage more attention is given to refining the movement skill and applying it as a specialized movement skill to some form of recreational or introductory sport related activity. More attention is given to smoothing out the task through further practice and utilizing the skill in an applied sense. Our ball thrower, for example, now applies her overhand throwing skills to a variety of throwing games.

**Advanced/Fine Tuning Level**

The advanced, or fine tuning, level is the third and final level in learning a movement skill. The learner at this level has a complete understanding of the skill. The mental plan for the skill is highly developed, and very little attention is paid to the cognitive aspects of the task. In fact, individuals at this level often have difficulty describing how they perform the activity. They often resort to a "let me show you" or a "do it like this" statement, followed by actual performance of the skill. The learner at this level is refining and fine-tuning skills. There is a general appearance, of ease, mastery, and total control. The performer is able to scan out irrelevant information and is not bothered by distractions. There is excellent timing and anticipation of movements, and the action appears to be automatic, although in reality it is a finely tuned skill requiring only minimum conscious control.

**Performance Stage.** At this stage in the movement skill learning process the learner is further involved in refining the elements of the movement task, but with emphasis on utilizing it in a variety of performance situations. Precision and utilization of the skill in a variety of settings ranging from game, dance and recreational activities, to a variety of youth sport experiences is stressed at this stage. For example, our ball thrower now combines her ball throwing skills with catching, batting and base running to play the game of baseball on a local youth sport team.

**Individualized Stage.** Although children are seldom at this stage, learners at the individualized stage in the movement skill learning hierarchy are personalizing their performances. They make fine-tuning adjustments and modifications in execution of the specific task in accordance with individual needs. The learner makes personalized performance adjustments to take advantage of individual strengths or limitations in the performance of the task.
THE TEACHER'S ROLE IN MOTOR DEVELOPMENT AND MOVEMENT SKILL LEARNING

Each level in the process of motor development and movement skill learning requires knowledgeable, and sensitive guidance by qualified teachers. The characteristics of the learner must be understood for the time spent in physical education to be structured for maximum learning. Acquiring skill in movement takes time. Unfortunately, teachers frequently do not have time set aside for instructional physical education. Organized, quality instructional sessions geared to the movement skill level and the developmental level of the learner are crucial to realizing children's potential in learning-to-move and learning-through-movement. Teachers must identify both the developmental level of their students and their level of movement skill learning to plan appropriate educational experiences.

For example, three and four year olds are typically at the beginning level of learning numerous fundamental movement skills, and at the initial stage within the fundamental movement phase. Creating an atmosphere conducive to learning that is in harmony with their being at the exploratory and discovery stages is essential. The atmosphere should help children develop a general awareness of the essential elements of fundamental movement skills, and provide ample opportunity for movement exploration and self-discovery. Teachers can do this by using problem solving and movement challenge techniques that ask leading questions or make statements such as "Who can--?"; "How many ways can you--?"; "See if you can--." or "Let's try--." The objective of the teacher of children at this level should be to develop an awareness of the movement skill, and to permit exploration, experimentation, and self-discovery of general aspects of the task.

Children at the practice level of learning new fundamental movement skills are typically four-, five-, and six-year olds who are also at the elementary stage in the fundamental movement phase of development. Teachers of children at this intermediate level should recognize that children have the general idea of movement and should focus on skill enhancement through practice. Practice sessions should promote skill refinement and maximize learner feedback. Direct teaching techniques coupled with indirect techniques focusing on refining the skill and applying it with success to a variety play and cooperative game activities are especially helpful at this stage.

Children are sometimes at the fine-tuning level in some fundamental movement skills by ages six, seven, and eight, and therefore at the mature stage in the fundamental movement phase. The abundance of youth sport opportunities coupled with the tremendous surge of interest in sport by children during this period accounts for the need to have mature patterns of fundamental movement that can be applied to sports and increasingly demanding recreational activities. Using a combination of both direct and indirect teaching techniques is especially helpful at this stage, with particular attention on knowing the learner as an individual and maximizing individual performances.

ASSESSING PROGRESS

An important aspect of any sound educational program is assessment. Assessment provides teachers with a measure of children's current levels of ability, their progress, and the teacher's own effectiveness. Motor assessment is the collection of relevant performance
information for the purpose of obtaining reliable information on which to base curricular decisions.

By assessing children's current level of ability, a baseline or yardstick by which to measure progress is obtained. This form of assessment entry-level, or formative, assessment can be easily and quickly done at the very beginning of a new skill theme. With this information in hand, the teacher can develop a series of lessons based on where students are rather than where they should be. Entry-level assessment permits the instructor to fit the program to the needs of the student rather than fitting the student to a predetermined program.

Assessment serves a second vital function, measuring progress over time. Evaluation of progress at the end of a skill theme - exit-level, or summative, assessment. If your operational philosophy centers around the goal of individual improvement, then a combination of entry-level assessment ratings with exit-level assessment is needed.

Motor assessment also serves the practical function of measuring teacher effectiveness. By determining children's level of ability and rate of progress, teachers obtain an estimate of their effectiveness in terms of developing and refining movement skills.

With regard to developing and refining children's movement, assessment at both the beginning and the end of a skill theme is highly recommended. Master teachers continually assess their students through both informal and formal means. They constantly make adjustments and revisions in their lessons to facilitate learning. Two forms of assessment are appropriate and available: process assessment and product assessment. Both may be used, depending on the level of children's ability, the specific needs of the children and teacher, and the amount of available time.

**Process (Observational) Assessment**

Process, or observational assessment, is concerned with the form, style, or mechanics used to perform a movement skill. When focusing on the movement process, teachers are not concerned with the product of the act, such as how far the ball travels, how many baskets the child makes, or how fast the child runs the 50-yard dash. Instead, the teacher is concerned primarily with the body mechanics used to throw the ball, make the basket, or run the dash. Observational assessment is an effective subjective technique for knowledgeable teachers to use, especially when the primary goal is to teach people how to move. Concern for the proper mechanics, or the process of movement, must occur before focusing on the product.

The assessment approach advocated here recommends that, for children at the fundamental movement phase of skill development, we assess whether they are at the initial, elementary, mature, or a sport skill stage. It is not accurate to assume that all three- and four year olds will be at one stage, five and six year olds at another stage, and seven and eight year olds at yet another stage. Due to the varying backgrounds of children, including opportunities for practice, encouragement, and previous instruction, a rigid age-based approach to movement skill acquisition is not acceptable as a valid means for curricular planning. Therefore, observational assessment of the process of children's movement is essential for effective use of the developmental approach.
Observational assessment is subjective, and therefore requires the teacher to have a clear knowledge of what actually constitutes the proper mechanics of a wide variety of movement skills. Table 2 provides important guidelines for effective observational assessment of children's movement.

**Table 2: Guidelines for Observational Assessment of Children's Movement**

When observing and assessing the process of children's movement, it is important to:

- Be unobtrusive. This is especially important with young children, who will often alter their pattern of movement if they are aware that they are being observed.
- Stress maximum effort. Instruct children to throw as far, run as fast, or jump as high as they can. This will encourage their best performance.
- Stand where you can clearly view performance. Stand far enough away that you can observe the entire task.
- Observe segmentally. Look at one part of the movement at a time. For example, first focus on the leg action, followed by the trunk action, then the arm action.
- Compare. Occasionally ask another trained individual to observe and assess several children. Compare ratings for objectivity.
- Be consistent. Strive for consistency in your observations in order to maximize the reliability of your process assessments.

Figures 5 and 6 provide both a segmental observational assessment instrument and a simplified version suitable for use with groups of children at the fundamental movement phase of development. The group assessment form is helpful for charting entry and exit levels of ability throughout the year. The individual assessment form may be filled out from the group form and sent home periodically to inform parents of their childrens' progress in the developmental physical education program.
**Figure 5: Sample Segmental Analysis Chart**

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Observer</th>
</tr>
</thead>
</table>

Mark the proper stage (T.E.M.S.) for each body segment. Then give an overall rating in the space provided.

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
</table>

*T=initial stage, E=elementary stage, M=mature stage, S=sport-skill stage

Figure 6: Sample Total Body Configuration Assessment Chart

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Observer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FUNDAMENTAL MOVEMENT SKILLS**

**TOTAL BODY/GROUP OBSERVATION CHART**

<table>
<thead>
<tr>
<th>Mark the proper stage of each skill.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Then give an overall rating in the space provided.</td>
</tr>
</tbody>
</table>

| Stabilty Skills | 4 | 3 | 2 | 1 | 0 |  |
| Dynamic Balance |  |  |  |  |  |  |
| Body Rolling |  |  |  |  |  |  |
| Dodging |  |  |  |  |  |  |
| Jumping |  |  |  |  |  |  |
| Inverted Supports |  |  |  |  |  |  |
| Kneeling |  |  |  |  |  |  |
| Jump For Distance |  |  |  |  |  |  |
| Jump For Height |  |  |  |  |  |  |
| Sledging |  |  |  |  |  |  |
| Climbing |  |  |  |  |  |  |
| Throwing |  |  |  |  |  |  |
| Catching |  |  |  |  |  |  |
| Diving |  |  |  |  |  |  |
| Curling |  |  |  |  |  |  |
| Standing |  |  |  |  |  |  |
| Sitting |  |  |  |  |  |  |
| Lying |  |  |  |  |  |  |

* initial stage, E=elementary stage, M=mature stage, S=sport skill stage


**Product (Performance) Assessment**

Product, or performance, assessment is concerned with the how far, how fast, how high, or how many of movement - the end product of one's movement, as measured by elapsed time, as in the 20 or 50 yard dash; distance covered, as shooting; or the number of repetitions, as with situps or pushups. Performance assessment is an effective, objective
Developmentally Appropriate Practice for Fundamental Movement Skill Learning

technique to use in skill assessment after the mechanics (process) of a task have been mastered. After children have advanced to the mature stage of a skill, they are ready to begin applying the skill to sport-related activities. For example, the mature throwing pattern can now be further developed and applied to throwing a football or pitching a baseball. A sport skill, in terms of mechanics, is little different from the fundamental movement skill. The goal has changed in terms of the speed, accuracy, or distance required for success in the sport activity, but the basic mechanics are essentially the same, adapted only to the specific demands of the task.

The key to successful evaluation is to keep it simple. Elaborate diagnostic procedures are not needed. As long as teachers are familiar with the developmental characteristics of fundamental skills, observational assessment (process assessment) will generally suffice. Based on informal evaluation of progress or lack of progress, teachers need to modify learning experiences. Constant monitoring of children's progress provides the information necessary for planning effective, challenging, and developmentally appropriate curriculum.

CONCLUSION

Knowledge that movement skill development depends on environmental factors such as ample opportunities for practice, encouragement, and quality instruction has important implications for the motor development and movement education of young children. For children, developmentally appropriate instruction is essential. This instruction must be coupled with sufficient time for practice in skill learning and the use of positive instructional strategies. Instruction, however, does not explain learning; development does. Only through the process of learning more about the motor development of children are teachers able to use appropriate instructional strategies.

Motor development is a process that is age-related, but it is not age-dependent. The process of learning a new movement skill is age independent. Motor development and movement skill learning are highly individualized because of the unique hereditary and experiential background of each child. Therefore, it is inappropriate to classify movement activities by age or by grade level. Such a procedure violates the principle of individual appropriateness. Care should be taken to select movement experiences based on developmental needs of children, as well as their typical age-related interests.

Knowledgeable teachers recognize that the developmentally appropriate movement experiences contained within the instructional physical education program have great potential to make real contributions to children's movement literacy, fitness literacy, cognitive literacy and affective literacy.

REFERENCES

Connections Between Physical Education and Sports Science in the New Millennium: A Bridge Too Far?

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Abstract
This paper attempts to draw connections between physical education and sports science with the application to teaching of physical education, sports and physical activities in schools in particular. Discussions and illustrations of relevant issues are provided with respect to: (a) historical perspective of the development, progress and linkage of physical education and sports science with reference to definitions, goals and objectives, and body of knowledge, (b) application and integration of sports science disciplines such as exercise physiology, sports nutrition, sports psychology and sports biomechanics in relation to physical education, and (c) the new state-of-the-art Human Performance Laboratory, Department of Physical Education and Sports Science, the Hong Kong Institute of Education - an attempt to bridge the gap.

INTRODUCTION
The last 35 years has witnessed significant changes in the field of physical education from the single focus of traditional sports skill-oriented nature of teacher training to the generation of a broader emphasis on physical activities that enable graduates to embrace lifelong active living habits. Diversifying from the concentration of investigating physiological, biochemical, psychological, biomechanical and nutritional aspects to enhance elite sports performance (Chin et al., 1992; Chin, 1994; Chin et al., 1994a; Chin et al., 1994b; Chin et al., 1995a; Chin et al., 1995b; Ding et al., 1999; Lo & Chin, 1991; Gao et al., 2001; Suraez et al., 1995; Yuan et al., 1995), the new direction in sports science in movement and health related sciences will bring new or improved methods and expertise to support scientific physical education to meet the society’s changing needs (Charles, 1996; Chin, 1997; Chin et al., 2000; Chin & Yang, 2000; Chin, 2001; Edginton et al., 1994; Yang et al., 1997; Yang et al., 1999).

At the 2000 AAHPERD National Convention & Exposition in Orlando, Florida, USA (March 21-25, 2000), the theme was Connections, of which six connections for the new millennium were included: (a) connect people and fitness, (b) connect people and play, (c) connect sports and women, (d) connect lifestyles and fitness, (e) connect body and music,
and (f) connect mind and body. In this paper, one more connection is added for discussion -- the linkage of physical education and sports science.

**HISTORICAL DEVELOPMENT, DEFINITIONS, AND LINKAGE OF PHYSICAL EDUCATION AND SPORTS SCIENCE**

In the following analysis it is necessary to combine three aspects relating to physical education on one hand, and to sports science on the other hand. Based on a short presentation of the historical development of the two constructs called physical education and sports science, definitions of physical education and sports science will be presented. On this basis, the linkage between physical education and sports science will be described as well.

**Historical Development Related to Physical Education and Sports Science**

From a historical perspective it should be stated, that first and foremost, human beings have always been moving, playing, and performing physical exercises. Today, these physical exercises often manifest themselves in some sophisticated way that we call sport. In other words, educational or scientific consideration followed the practical realization much later. Over a long historical period, these aspects were not even considered.

The educational dimension, which means physical education, is documented first extensively in Greek history. In Athens, Sparta and other places within Greece and later Rome, educational aspects of physical exercises were clearly seen and recognized. Even if physical education within the school setting is in a deep crisis today, the educational values related to movement, play, and sport are seen and implemented within school (somewhat in danger), and to an even greater extent in all kinds of settings outside of school.

Only when the so-called scientific age began in the 19th century the first roots of a science-oriented analysis of movement, play, and sports began. In other words, sports science and the endeavor to gain scientific knowledge related to these phenomena is third in the chain of practical realization. Today a very sophisticated, differentiated and complex system of sports science has developed worldwide, so that a huge amount of knowledge related to the phenomena of movement, play, and sports is available. Despite this fact, the educational dimension is obviously in need of a better justification, in order to overcome these difficulties as they relate especially to school physical education. Maybe a gap between sports science and physical education is also the reason for this negative development.

Within this analysis it is not possible to describe the historical development of physical education and sports science. However, the sequence of origination, as presented in this first part has to be considered in order to work on a tighter linkage.

**Definitions of Physical Education and Sports Science**

Physical education has been used incorrectly over quite some time, especially in North America where the term has been used to define an academic discipline. Henry (1970, p. 282) for example, wrote as a major authority in physical education in the USA: ‘If the
academic discipline of physical education did not already exist, it would need to be invented". In 1978, Haag published a book in the USA with the title: Sport Pedagogy. Content and Methodology. With this book the German and European definition of sport pedagogy as one sub-discipline of sport science (a term including natural science, social-behavioral science and humanities) was brought to North America. Today this terminology is accepted worldwide (compare the "International Committee of Sport Pedagogy within ICSSPE; Feingold & Crum, 2000; Piéron & Barette, 1990).  

In the following the two central terms are defined in an exemplary way (Haag, 2001).  

**Physical Education** - "sport, sport instruction; originally (in reform pedagogy) the complete education of the human being starting from the body. The term originates from reform pedagogy, which intended to make a contribution towards the total education of the human being on the basis of human physicality by means of movement, sport, and play. After 1945 physical education was understood as holistic education following the fundamental principles of naturalness, proximity to life, spontaneity, social binding, value orientation, and popularity. Today, physical education manifests itself predominantly in movement education, health education, play education, and education towards a sensible utilization of leisure-time. It also stands for the pedagogic training of motor characteristics, skills and abilities within the framework of physical culture, which is predominantly used in the former socialist nations. In many English-speaking countries the term physical education is still used to refer to sport instruction in schools and to the field of physical education teacher training and sport science in general. However, it should be noted that many universities, particularly in North America, have changed the name of their departments dealing with sport instruction and sport scientific issues; examples from the range of more than 80 different names are human kinetics, kinesiology, and human performance studies. Within the framework of sports science, the theory of physical education is referred to as sport pedagogy" (p. 313).  

**Sports Science** - "system of scientific research, theory and practice of sport, into which results from other disciplines are integrated. Purpose and function of sport science is to investigate problems or deficits that have been uncovered, transfer knowledge from solutions found within the framework of scientific justification, i.e., to transfer these solutions to practice, to explain, control and, if necessary, change them. The subject area of sport science can be categorized as follows: (1) according to organizational areas, e.g., physical education, school sport, youth sport, mass sport, recreational sport, sport-for-all, competitive sport, high-performance sport, top-level sport; (2) according to thematic research questions, e.g., analysis of human movement, motor development, motor learning, motivation in sport, socialization in sport, performance, health in sport, structure and function of sport in society, etc.; (3) according to scientific-systematic criteria e.g., into seven theory fields of sports science medical and mechanical foundations (sports medicine, sports biomechanics), social and behavioral scientific foundations (sports psychology, sports pedagogy (compare Grupe & Kruger, 1997; Prohl, 1999), sports sociology), historic-philosophical foundations (sport history, sport philosophy). New theory fields are emerging, e.g., sport economy, sport facilities and equipment, sport law, sport politics, computer science and sport, and sport information. In regard to its methodology sports science utilizes the general scientific methods of hermeneutics and empiricism. In a model of research methodology one can differentiate between the following steps of a research process scientific philosophy, research methods, research design, techniques of data collection, techniques of data evaluation, and knowledge transfer" (pp. 424-425).
Linkage of Physical Education and Sports Science

Complaints are often raised that research results are not transferred to practice, that there is a large gap between theory and practice, as well as between practice and theory. At least in the long-range perspective research can only be justified if research results are applied. Even so-called fundamental research has an application perspective, since often this fundamental research (e.g., development of a fitness test) is a prerequisite for applied research (e.g., analysis of the fitness of elementary school children in a certain region).

Under the assumption that physical education is a process, much like education in music, art, health, or recreation, the linkage to sport science can be established with the paradigm of transfer from theory to practice. This can also be formulated by the question “What is the practice-theory and theory-practice paradigm?” By explaining three dimensions of practice according to Haag (1994b, pp. 115-117), the linkage between physical education and sports science might become clear.

If the requirement of knowledge transfer is discussed within sports science, the concept of practice can be looked at in a threefold manner:

First, practice means physical activity, physical exercise, movement, motor patterns, etc. “Bewegung” (movement) as the outside perspective and “Motorik” (motor behavior) as the inside perspective represent the basic nucleus, core or subject matter of our field. This type of practice can have many dimensions. Taxonomies for representing movement/motor behavior have been developed in order to explain the variability of this practice dimension. Two examples shall illustrate this:

a) The motor domain can be distinguished in the following aspects: anthropometric prerequisites; sensory abilities; conditional abilities, coordinative abilities; body perception; technical motor skills; tactical motor skills.

b) The sport skills, in other words the practical sport disciplines, can be distinguished in the following way: moving of the body (e.g., track and field); moving a piece of equipment (e.g., basketball); moving of an object with a piece of equipment (e.g., tennis); moving on a fixed apparatus (e.g., gymnastics); moving due to external forces (e.g., wind surfing).

These two examples give an indication of the large variety in regard to a necessary transfer of knowledge to this type of practice, namely movement and motor behavior.

A second dimension of practice, which is of interest in the “practice-theory and theory-practice” paradigm, is the sport-related professional performance. For a long time this sport-related professional performance consisted of teaching physical education in government institutions, especially schools (distinguished according to age levels or types of schools). Today, teaching physical education and coaching sports has been extended to many places outside of governmental institutions (e.g., sport clubs, YMCA’s, fitness studios, tourism). Furthermore, many non-teaching sport-related professional fields have evolved (e.g., sport and administration; sport and economy; sport and mass media; sport and recreation; sport and health). Thus, there is an increasing need for generating scientific knowledge in connection with the constantly growing practical area of sport-related professional performance, to which knowledge needs to be transferred.
A third dimension of practice in the context of transfer of knowledge is practice understood as the realization of the complex social phenomena of movement, play, and sport. It is the task of a responsible researcher to initiate, carry out, and evaluate research related to this form of reality. Research can be initiated by the researcher and by outside request. If sports science takes on this responsibility very carefully, then a large amount of research is carried out, resulting in many theories, which in turn have to be transferred into this type of practice, namely movement, play, and sports. In this way, realities related to movement, play, and sports can be better understood in their development and present status, controlled, and possibly changed in the future if necessary. This third dimension of practice, to which transfer of knowledge takes place, is a highly comprehensive one, in other words it has many aspects.

In summary, it appears as if transfer of knowledge or “the practice-theory and theory-practice” paradigm constitutes a very important and necessary aspect of the theoretical foundation of sports science as a scientific discipline.

The linkage also may be realized by considering ‘sports instruction’ (sports didactics) as a fundamental theme field of sports science besides movement, play, and training. Of course, ‘sports instruction’ has a high affinity to the theory field of sport pedagogy (Haag, 1982, 1989a, 1989b, 1994a, 1994b; Haag & Hummel, 2001; Piéron & Graham, 1986; Piéron & Cheffers, 1988; Schempp, 1996). However, as with other theme fields, an area such as sports instruction also has to draw on scientific knowledge coming from sports medicine, sports biomechanics, sports psychology, sports sociology, and sports philosophy. If this interrelationship is realized, the gap between physical education (which is close to ‘sports instruction’ and sports science) can be closed. This again is very important for the sound development of the teaching and coaching profession related to movement, play, and sports.

INTEGRATION AND APPLICATION OF SELECTIVE AREAS OF SPORTS SCIENCE IN PHYSICAL EDUCATION

A challenge to physical education as it enters the 21st century is to develop scholarship that is integrative; that incorporates the interconnectedness of the humanities, social sciences, and sports sciences into the study of physical activity. This goal can be accomplished by the support of using the innovative teaching strategy within a creative curriculum, which meets the needs of the lifelong learning society. The following examples of integration and application of exercise physiology, sports psychology and sports nutrition in physical education are used for illustrations.

Exercise Physiology (Physical Fitness and Physical Activities)

Over the past 20 years, the concept of physical fitness as applied to children has changed; that is, the emphasis is no longer on motor-related (or performance-related) fitness but on health-related fitness. In the 1970s, as interest in aerobic fitness, strength, leaness, and flexibility began to grow, the focus shifted towards achieving good general health. Because the process that leads to chronic degenerative diseases of adulthood are often set in motion during childhood and adolescence, it is reasonable to pursue health-related fitness at an early age. It is now estimated that 26% of school children are reported to be overweight in United States (Troiana & Flegal, 1998). In 1993, a study conducted by the Chinese University of Hong Kong Pediatric Department showed that 13.4% of boys and
10.5% girls between age of 6 and 18 are obese (Leung, 1994). A similar finding was reported in a study in Singapore (Ministerial Committee on Obesity and Health, 1991).

Major consequences of obesity in youth such as cardiovascular disease, hypertension, joint stress and other health problems are well documented (Strand, Scantling, & Johnson, 1997). One of the major causes of obesity is due to the lack of physical activities (U.S. Department of Health and Human Services, 1996a), which provides a new challenge for physical education teachers. The decline in physical activity begins as early as primary school. Hovell et al. (1999) examined the physical activities of 1,041 children in 4th and 6th grade at seven primary schools in Southern California, USA and found a significant decrease in individual activities such as running and swimming. Another study reported that participation in all types of physical activity for children and youth declines as age and grade in school increases (U.S. Department of Health and Human Services, 1996b). Furthermore, the linkage of childhood exercise and health with adult exercise and health throughout life has been well illustrated in the conceptual model presented by Blair et al. (1989). This conceptual model was supported by a recent study conducted by Trudeau et al. (1999) in their investigation on the benefits of physical education in primary school in the exercise habits after 20 years. Recommendations have been proposed in the past years for changes in the school curriculum to ensure that programs are included to help children learn lifetime activities and to provide moderate to vigorous physical activities (Haywood, 1991; Presidents Council on Physical Fitness and Sports, 1996; Nelson, 1991; Sallis & Mckenzie, 1991; Stratton, 1995).

Heart Rate Monitoring and Concept-Based Fitness Education

Heart rate monitoring is a popular method to measure physical activity during physical education lessons (Gilbey & Gilbey, 1995; Kirkpatrick & Birnbaum, 1997; Strand & Reeder, 1993; Stratton, 1996; Wong & Macfarlane, 1997). The content of the physical lessons can be designed to help all children experience regular moderate-to-vigorous-physical activity (MVPA) by reaching the target heart rates for their age groups. Students can be monitored to keep moving as much as possible during the practice of sports-related skills as proposed in the Fit-Sport Model (Everhart et al., 1999). Children and youth can also be taught fitness concepts such as target heart rate, frequency, intensity, and time (F.I.T.) formula, stretching principles, and personal fitness program. The idea of using five different heart rate zones (fat burning zone, healthy heart zone, kick it zone, power zone and red zone) can be applied at Agassiz Middle School, Fargo, North Dakota, USA is a good illustration for the integration of fitness concepts in physical education (Strand et al., 1997).

In the unprecedented changes in education, physical education teachers are encouraged to develop programs that focus on teaching lifetime activities (Presidents Council on Physical Fitness and Sports, 1996). The integration of scientific findings into the actual levels of new physical activity during the physical education lesson (Mckenize, 1999a), combined with effective and innovative teaching strategy, may provide a new insight for the rationale of changing the traditional skill-based curriculum.

Sports Nutrition

The increasing prevalence of childhood obesity suggests that interventions are needed, and school-based programmes continue to offer the most promise for influencing the greatest numbers of children and adolescents. The underlying concept is that reducing dietary calories and fat and increasing physical activity, both in schools and out of school, should
Connections Between Physical Education and Sports Science
in the New Millennium: A Bridge Too Far?

Contribute to a slower rate of accumulation of adipose tissue (Cheung & Richmond, 1995). Programmes such as physical activity, diet and nutrition education; modified school lunch (since altering school lunch can directly influence the intake of a large proportion of the students); parental involvement; and behavior modification (to develop a personal plan for behavior change by employing such methods as goal setting, monitoring progress, problem-solving skill training, peer modeling and incentives) should be introduced in schools.

Innovative Nutrition Projects in Schools

One of the long-term and multidisciplinary projects in physical activity and nutrition in schools is M-SPAN (Middle-School Physical Activity and Nutrition, 1996-2000), supported by the National Institutes of Health (NIH). It is a 4-year study of a physical activity and nutrition intervention in 24 middle schools (grades 6-8) in San Diego county, USA. Staff development, materials and services to increase student activity levels and promote the consumption of less dietary fat are carefully planned and monitored. Local teachers were offered assistance to modify their existing curricula (McKenize, 1999b).

Another innovative idea used at Fargo South High School, North Dakota, USA to help secondary school students understand the relationship between proper nutrition and physical activity is creating a unit of study called “calorie education”. Physical activity target for caloric expenditure including minimal benefit zone, health improvement zone, optimal health zone and high performance zone are introduced to the students. The following educational labs designed to teach students about the concepts of caloric balance are then developed: (a) estimation of resting metabolic rate; (b) estimation of calories expended in activity; (c) computation of caloric expenditure; (d) estimation of recommended energy intake; (e) estimation of caloric intake and determination of the caloric balance; (f) introducing motion sensors; and (g) developing individual time and caloric charts (Strand & Roesler, 1999).

Sports Psychology

Physical activity improves depression, reduces anxiety, and exerts a positive effect on self-esteem, self-confidence and overall psychological well-being (Boyd & Hrycak, 1997; Landers & Petruzzello, 1994; Morgan, 1994; Raphael, 1998). Frydenberg and Lewis (1993) reported that for adolescent boys sport activities are an especially important factor for their socialization, self-confirmation, self-esteem and relaxation. A recent study by Tomori and Zalar (2000) indicated there was an association between suicide risk and sport in adolescents in Slovenia. The authors suggested special attention and support for the adolescent to engage in physical activity since diminished activity, reduced energy, and loss of enjoyment and interests are characteristic symptoms of depression.

Research has indicated that concentration of primary and secondary school children is trainable (Yin et al., 2000). Moreover, a developmental and preventative approach to grasp sports psychology concepts in the learning process with application in physical education has been discussed (Sinclair & Sinclair, 1994; Sherman, 1998).

Mental Management Skills in the Physical Education Curriculum

Sherman (1999) proposed an integration of mental management skills into the physical education curriculum. He proposed the five phases of learning, which were adapted on
Singer’s five-step approach (1988). The five phases are: (a) setting a goal; (b) identifying relevant cues (focusing and refocusing skills); (c) formulating a motor plan using imagery; (d) executing the skill; and (e) evaluating feedback. Three learning strategies—goal-setting, and imagery, and self-talk are also proposed with connections to efforts for encouraging self-regulated learning in physical education classrooms (Anderson, 1997). The integration of quality imagery with quality movement in 7-to 10-year old table tennis players during a 20-week imagery training program improved both their accuracy and techniques (Zhang et al., 1992). The prospects for the use of mental training programs in regular physical education program to enhance skill acquisition and stress management is encouraging.

HONG KONG INSTITUTE OF EDUCATION: AN ATTEMPT TO BRIDGE THE GAP OF PHYSICAL EDUCATION AND SPORTS SCIENCE?

One of the guiding values of the Hong Kong Institute of Education (HKIEd) is to integrate advanced technology with creative arts, physical education and all other areas of knowledge to realize multiple modes of intelligent thought and action (Hong Kong Institute of Education, 1999, p. 3). How physical education and sports science can make a “connective contribution” in the current educational reform in Hong Kong for the 21st century is an interesting area to explore.

The Hong Kong Special Administrative Region (HKSAR) Government’s intention together with the Institute’s vision is to improve the quality of school education. Physical education can play a very important role in helping students develop positive attitudes and the ability to appreciate the significance of moral, social, aesthetic and affective values through physical activity. HKIEd is a prominent contributor of over 90% of physical education teachers for primary and secondary schools and the institute is in a special position of being able to reach quite boardly to influence each and every child through the quality of teaching physical activity.

One of the milestones of the new development for bridging the gap of physical education and sports science is the changing of the name of the Department at HKIEd. On 20 January 1999, the Department of Physical Education was renamed to the Department of Physical Education and Sports Science. The state-of-the-art Human Performance Laboratory (HPL) with over US$ 830,000 of sports science equipment was established on 1 November, 1999. To change from a traditional skill based teaching program to an innovative skill and knowledge-based academic discipline, future physical education teachers require scientific knowledge to support their teaching. HPL provides an excellent vehicle and support to teaching and research in physical activity with illustrations of the theoretical principles through demonstrations, small group lab projects and assessments to facilitate action learning. By putting theory into practice, the following new initiatives and illustrations in teaching health, physical fitness and sports training have served as examples in this case study.

Physical Best in Hong Kong

Physical Best (PB) is a comprehensive health-related fitness education program originally developed by the American Alliance of Health, Physical Education, Recreation and Dance (AAHPERD) in the United States. It intends to provide school aged children education that
could facilitate their learning of knowledge, attitudes, and skills that would help them to live a healthy and fit life. The program includes a text on exercise science to support the activities; a computerized fitness and activity assessment plan; and curricular support materials that include newsletters, letters to parents, and numerous record-keeping forms (Feingold, 1999, p. 2). The ready-to-use activities can be inserted into an existing lesson plan to reinforce the concepts of nutrition and fitness, components such as aerobic endurance, muscular strength and endurance, body composition and flexibility.

After a year of careful planning, as the first international launch of Physical Best outside of the United States, 4 PB trainers traveled halfway around the world to present a 2-day workshop (18-19 June, 1999) to 82 elementary physical education teachers from 63 schools the first day and 160 secondary physical education teachers from 116 schools the second day at HKIEEd. The content of each 8-hour intensive workshop included the following: (a) history of fitness education; (b) philosophy of Physical Best; (c) methods of instruction; (d) classroom management strategies; (e) health-related fitness knowledge base; (f) FITNESSGRAM assessment techniques and software demonstration (FITNESSGRAM Software – version 6.0 (Cooper Institute for Aerobic Research, 1999); (g) goal-setting and motivation; (h) activities teaching warm-ups, health-related fitness components and FITT principle; (i) progression and cool down; and (j) skills for planning and follow up. The new Physical Best Activity Guides and Teacher’s Guides were presented to workshop participants. A survey on participants for their perception about the PB workshop as well as the opinions regarding feasibility of implementing such a program in Hong Kong was also conducted to assess the outcomes of the workshop (Chin et al., 2000; Chin & Yang, 2000).

State-of-the-Art Human Performance Laboratory (HPL)

“Learning is a process of active discovery” (Ayers, 1993, p. 3) and the set up of HPL provides a vehicle to facilitate the preservice students’ learning through the lecture-lab format in order to promote a greater understanding of physiological and biomechanical principles of exercise; health-related fitness and other aspects of sports science. In modern definition, health-related physical fitness components include cardiovascular fitness, muscular endurance, strength, flexibility, and body composition (Caspersen et al., 1985; Pate, 1988). Various types of technology and information regarding body composition analysis system, energy expenditure unit, portable telemetry system, spirometer, blood pressure monitor, heart rate monitor, motion sensor, cycle ergometer, vertical jumper meter, blood analysis system, isokinetic dynamometer, motion analysis system, electromyography system, fitness testing software, and others are shared with the students in HPL.

Body Composition Assessment

Obesity has been termed as one of the major medical problems in the 20th and 21st century (Gortmaker et al., 1990; Webber et al., 1995). The identification of obesity has been conducted by using the measurement of body composition. The students have hands on experiences by using Harpenden skinfold calipers (Quinton Instrument Co; Seattle, Washington, USA); the bioelectrical impedance analysis which includes standard bioimpedance measure (Biodynamics Corporation; Seattle, Washington, USA); foot-to-foot bioimpedance measure (Tanita Corp. of America; Skokie, Illinois, USA); and arm-arm bioimpedance measure (Omron Corp Healthcare Inc.; Vernon Hills, Illinois, USA); and BodPod: Body Composition System (Life Measurement Instruments; Concord,
California, USA). The BodPod Body Composition System is developed with a new and innovative technology based on the same principle as hydrostatic weighting, but uses air instead of water (Collins et al., 1999).

**Cardiorespiratory Assessment**

The pulmonary function variables (e.g., vital capacity, forced expiratory volume in one second, peak expiratory flow rate, etc.) are measured by the Pony Spirometer (Cosmed; Rome, Italy) to illustrate the efficiency of the respiratory muscles by which air can be breathed in and out to furnish the oxygen transport system.

Maximum oxygen uptake, $\dot{V}O_{2max}$, is illustrated by using a continuous running test performed on a Sensormedics 2000 treadmill (Sensormedics; Yorba Linda, California, USA) or a bicycle test performed on a Monark 834 E cycle ergometer (Monark; Varberg, Sweden). Metabolic and respiratory measurements are obtained using a Sensormedics Vmax 29 Energy Expenditure Unit connected with a ECG monitor (Sensormedics; Yorba Linda, California, USA) and included heart rate, expiratory minute volume (VE), VO$_2$, VCO$_2$, respiratory quotient, FECO$_2$, and O$_2$ pulse which were computed and displayed breath by breath. Blood lactate, blood glucose, total cholesterol (Total-C), high-density-lipoprotein (HDL-C), low-density-lipoprotein (LDL-C), and triglycerides concentrations are determined using an YSI 1500 Sport Lactate Analyzer (Yellow Springs Instrument; Yellow Springs, Ohio, USA) and Reflotron IV (Boehringer Mannheim GmbH; Sandhoelzer, Mannheim, Germany) respectively.

The submaximal aerobic power is indirectly assessed by recording the heart rate with the Polar Vantage NV and PE 4000 heart rate monitor (Polar Electro Oy; Kempele, Finland) on a Monark 834 E cycle ergometer (Monark; Varberg, Sweden) through a progressive increase of work rate.

The cardio-pulmonary responses and energy expenditure of various sports and physical activities on field are assessed and illustrated by the Cosmed K4b$^2$ telemetry system (Cosmed; Rome, Italy). Concepts of daily physical activity related to activity calories and total calories expended are introduced through the usage of Bio-trainer (IM System; Baltimore, Maryland, USA) and Trirac-R3D (Reining Instrument; Madison, Wisconsin, USA) motion sensors.

**Muscle Strength, Power and Endurance**

Muscle strength and endurance are measured using an isokinetic dynamometer (Cybex Norm; New York, USA), which can be used to assess the peak torque and the ankle of occurrence, the agonist and antagonist ratio, the endurance ratio and bilateral limb comparison. The concept of injury prevention and muscle training can be demonstrated through the practical illustration. It has been known for some time that muscle strength imbalance can predispose an athlete to injury, and restoring the relationship between the hamstring and quadriceps muscle strength pattern is an important measure that should be a primary concern in the training and rehabilitation programme (Perrin, 1993). The relation of hamstring to quadriceps strength (H: Q ratio), an index of muscle strength balance, varies between 50% and 62% in healthy people (Knapi & Ramos, 1980) - 60% has been suggested to be ideal (Burkett, 1970).
Connections Between Physical Education and Sports Science
in the New Millennium: A Bridge Too Far?

Explosive power is measured by Vertisonic Vertical Jumper Meter (Lafayette Instrument; Lafayette, Indiana, USA) and Wingate Test on Excalibur Sport Bicycle Ergometer (Lode Medical Technology; Groningen, Netherlands).

Motion Analysis

A set of kinematics and kinetics analysis equipment included 4 professional video cameras (Bioengineering Technology System, Milan, Italy), two force platforms (9281C, Kistler Instrument: Winterthur, Switzerland) and 16 channel EMG system (TELEMG, Bioengineering Technology System; Milan, Italy) which are integrated by the Elite Motion Analysis System (Bioengineering Technology System; Milan, Italy) are used in motion analysis. With 3-D video filming and consecutive videotape digitization, profiles of sports activities, dance and creative movement, and proposals for improved performance and accelerated learning of new skills can be given to enhance the scientific teaching and learning of sports and movement. The key and fundamental concepts and principles of linear and angular kinematics in sports biomechanics can be illustrated more effectively to students through demonstration and lab work.

CONCLUSION

The last 35 years have witnessed significant changes in the field of physical education from the single focus of traditional sports skill-oriented nature of teacher training to the generation of broader front with emphasis on physical activities that enable graduates to embrace lifelong active living habits. The connection and integration of physical education and sports science with multidisciplinary approach is essential to supplement a creative, innovative and scientific physical education curriculum in movement, play and sports. The current trend of integration of scientific teaching in our profession is in agreement with the philosophy of the pioneers in physical education more than 100 years ago. In 1890, Luther Hasley Gulick, the Director of the Physical Department of the International Young Men’s Christian Association (YMCA) declared physical education to be a new profession “involving for its fullest appreciation a profound knowledge of man through physiology, anatomy, psychology, history and philosophy” (Gulick, 1890). Thomas Denison Wood, M.D., Director of Hygiene and Physical Training at Stanford University shared the same philosophy. Introducing his paper “Some Unsolved Problems in Physical Education” at the 1893 Congress, he declared, “The great need in physical education to-day is the scientific spirit – the spirit which inspires the student to seek for truth and for its useful application ... Here are the fields for the biologist, the physiologist, the psychologist, and the physical and general educator” (Wood, 1894, p. 621).

In Hong Kong, an attempt to bridge the gap of physical education and sports science by putting theory into practice at the Hong Kong Institute of Education is a fine example at the Asia-Pacific region. The newly established Human Performance Laboratory provides an excellent vehicle and support to teaching and research in physical activity with illustrations of the theoretical principles through demonstrations, small group lab projects and assessments to facilitate action learning.

REFERENCES

Connections Between Physical Education and Sports Science in the New Millennium: A Bridge Too Far?


Physical Fitness, Physical Activity and Physical Education

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Abstract
A sedentary adult lifestyle is associated with all-cause mortality. The effect of regular physical activity in promoting aerobic fitness, increasing muscle strength, improving blood lipids, reducing high blood pressure, decreasing the risk of colon cancer, countering obesity, retarding osteoporosis, enhancing blood glucose control, and raising psychological well-being is extensively documented. The health benefits of physical activity during childhood and adolescence have been studied less frequently but appropriate physical activity during youth has been demonstrated to promote skeletal health, reduce body fatness, increase aspects of health-related fitness and enhance psychological well-being. Furthermore, there is a growing conviction that adults' health and well-being has its origins in behaviour established during childhood and adolescence and that inactive young people are unlikely to become physically active adults.

Are young people fit? If we focus on aerobic (or cardiovascular) fitness the available data demonstrate that boys have higher levels of fitness than girls even in primary school and the sex difference becomes more pronounced as young people progress through secondary school. There is, however, no scientific evidence to demonstrate that young people's aerobic fitness is low and that it has deteriorated over the last 50 years.

Are young people active? Many youngsters have adopted sedentary lifestyles and seldom experience the frequency, duration and intensity of physical activity recommended for health-related outcomes. Boys are more active than girls, at least from 3 years of age, and adolescents' activity levels deteriorate markedly as they move through secondary school. Energy intake data indicate a radical decrease in young people's physical activity over the last 50 years.

This presentation will critically review the data on people's fitness and physical activity levels and explore the role of physical education in encouraging youngsters to adopt more active lifestyles which are likely to be sustained into adult life.

A sedentary adult lifestyle is associated with all-cause mortality. The effect of regular physical activity in promoting aerobic fitness, increasing muscle strength, improving blood lipids, reducing high blood pressure, decreasing the risk of colon cancer, countering obesity, retarding osteoporosis, enhancing blood glucose control and raising psychological well-being is extensively documented (US Department of Health and Human Services, 1996). The health benefits of physical activity during childhood and adolescence have been studied less frequently but appropriate physical activity during youth has been demonstrated to promote skeletal health, reduce body fatness, increase aspects of health-
related fitness, and enhance psychological well-being (Armstrong & VanMechelen, 2000; Armstrong & Welsman, 1997). Furthermore, there is a growing conviction that adults' health and well-being has its origins in behaviour established during childhood and adolescence and that inactive young people are unlikely to become physically active adults (Activity and Health Research, 1992).

This paper will review young people's physical fitness and physical activity patterns in the light of current recommendations for health-related behaviour and explore the role of physical education in promoting and fostering active lifestyles.

Are Young People Fit?

Physical fitness is a complex phenomenon which is extremely difficult to define. Due to time constraints, in this presentation I will focus upon arguably the most important component of physical fitness, aerobic (or cardiovascular) fitness. Aerobic exercise is dependent upon pulmonary, cardiovascular and haematological components of oxygen delivery and the oxidative mechanisms of the exercising muscles. As maximal exercise is limited by peak oxygen uptake (peak \( \text{VO}_2 \)) this parameter is widely recognized as the best single index of aerobic fitness (Armstrong & Welsman, 2000a). The measurement of peak \( \text{VO}_2 \) requires the child to exercise to exhaustion while his/her oxygen consumption is monitored. Reliable data on children under the age of 8 years are difficult to obtain and I will therefore limit my discussion to the more secure database of young people aged 8 to 16 years.

Peak \( \text{VO}_2 \) demonstrates a progressive rise in relation to chronological age in both boys and girls. At the beginning of secondary school (11 years of age) boys' peak \( \text{VO}_2 \) is about 18% higher than that of girls, probably due to boys' larger stroke volume during exercise. As sex differences in muscle mass and haemoglobin manifest themselves the sex difference in aerobic fitness increases to about 37% by the end of compulsory secondary education (Armstrong & Welsman, 2000b).

To compare the peak \( \text{VO}_2 \) of young people of different body size it is conventional to express peak \( \text{VO}_2 \) in ratio with body mass. When aerobic fitness is expressed in this manner a different picture emerges. Boys' mass-related peak \( \text{VO}_2 \) remains stable from childhood through adolescence whereas in girls a gradual deterioration in peak \( \text{VO}_2 \) can be observed. Using this conventional analysis maturation has been demonstrated to exert no additional influence on peak \( \text{VO}_2 \) above that "caused" by growth. However, in a number of publications we have demonstrated that the use of the ratio method to control for body size has clouded our understanding of the independent contributions of age and maturity to the growth of peak \( \text{VO}_2 \) (Armstrong & Welsman, 1994; Armstrong & Welsman, 2000a; Armstrong & Welsman, 2000b). With body size appropriately controlled for, using either allometric scaling (Armstrong et al., 1998; Welsman et al., 1996) or multilevel modelling (Armstrong & Welsman, 2000b; Armstrong et al., 1999), boys' peak \( \text{VO}_2 \) increases through childhood and adolescence and into early adulthood. Girls' peak \( \text{VO}_2 \) rises into puberty and then levels off as they approach young adulthood. Maturation induces increases in peak \( \text{VO}_2 \) in both sexes independent of those explained by body size and age.

There is no scientific evidence to suggest that children's and adolescents' aerobic fitness has declined over the last 60 years and an analysis of data reported since the pioneering work of Robinson (1938) reveals a remarkable consistency over time in young people's peak \( \text{VO}_2 \) (Armstrong & Welsman, 1994; Armstrong & Welsman, 1997 and see Barnett et
al., 1996 for data on Hong Kong children). There is no consensus on levels of optimal aerobic fitness for young people but members of the European Pediatric Work Physiology Group (Bell et al., 1986) have expressed the view that there is a lower limit of peak VO₂ that, in the absence of other health-related problems, may represent a "health risk". Few studies have reported their data in sufficient detail to estimate the number of children and adolescents below this level of aerobic fitness but a re-analysis of the peak VO₂ scores of over 3,000 young people who have been tested in my Centre over the last 13 years revealed that less than 2% of the values fell below the proposed "health-risk" threshold.

Are Young People Active?

The problems associated with monitoring young people's physical activity patterns have been well-documented and although more than 30 methods of assessing physical activity have been utilized the validity of many of these techniques has not been established with children and adolescents. The technique used must be socially acceptable, it should not burden the young person with cumbersome equipment, and it should minimally influence his/her normal physical activity patterns. The most accurate estimates of physical activity come from objective methods used over several days and a minimum monitoring period of three days has been recommended. Yet, regardless of the methodology adopted data are remarkably consistent over a number of countries (reviewed by Armstrong & VanMechelen, 1998; Armstrong & Welsman, 1997; see McManus & Armstrong, 1997 for data on Hong Kong children).

Neither the minimal nor the optimal amount of physical activity for young people can be precisely defined at this time and whether children or adolescents are classified as "active" or "inactive" depends upon the activity criteria implemented. Two recent Consensus Conferences (NIH Consensus Development Panel on Physical Activity and Cardiovascular Health, 1996; Sallis & Patrick, 1994) have provided useful recommendations. The National Institutes of Health (1996) recommended that, "all children and adults should set a long-term goal to accumulate at least 30 minutes or more of moderate intensity physical activity on most, or preferably all days of the week" (p. 243). The International Consensus Conference on Physical Activity Guidelines for Adolescents (Sallis & Patrick, 1994) recommended that, in addition to a minimal amount of daily physical activity (i.e. 30 min of moderate-intensity physical activity), "adolescents should engage in three or more sessions per week of activities that last 20 minutes or more at a time and that require moderate to vigorous levels of exertion" (p. 308). Moderate activity was defined as equivalent to brisk walking and vigorous activity was defined as equivalent to jogging.

To estimate how many young people satisfy the above recommendations I will outline our observations of minute by minute heart rate monitoring from 0900 to 2100 of 8395 16-year-olds over a minimum of three normal weekdays. In addition, 366 youngsters were also monitored for the same period on a Saturday (summarized in Armstrong, 1998a; Armstrong, 1998b; Armstrong & Welsman, 1997). To interpret the heart rate data a representative sample of 100 young people exercised at various speeds on a horizontal treadmill. It was noted that, regardless of age, brisk walking and jogging generated steady-state heart rates of about 140 and 160 beats·min⁻¹ respectively. Moderate physical activity (equivalent to brisk walking) was therefore defined as eliciting a heart rate ≥ 140 beats·min⁻¹ and vigorous physical activity (equivalent to jogging) was defined as eliciting a heart rate ≥ 160 beats·min⁻¹.
The majority of primary schoolchildren met the NIH (1996) recommendation of accumulating at least 30 minutes per day of moderate intensity physical activity. Nevertheless, it was demonstrated that at all ages more boys than girls met the NIH target and that there was a steady decline with age throughout the primary school period. At age 10 years about 85% of boys and 72% of girls achieved the NIH criterion. However, during the secondary school period there was a dramatic decline in the percentage of both sexes accumulating 30 minutes of moderate intensity physical activity per day with less than 20% of girls and less than 30% of boys meeting the target at age 14 years.

Sustained 20 minute periods of either moderate or vigorous physical activity were sparse in all age groups. Eighty four percent of girls and 77% of boys did not experience a single sustained 20 minute period with their heart rate greater than 160 beats·min⁻¹. Less than 3% of boys were observed to experience the equivalent of a daily 20 minute period with their heart rate greater than 160 beats·min⁻¹ Of the 459 girls monitored for three weekdays and the 195 girls monitored on a Saturday, not a single girl experienced the equivalent of a daily 20 min period of vigorous physical activity. Even 10 minute periods of moderate intensity physical activity were rarely experienced by significant numbers of young people demonstrating that sustained periods of physical activity do not characterize young people's physical activity patterns.

We can therefore conclude that many children and adolescents seldom experience the intensity and duration of physical activity recommended for health-related outcomes. Regardless of how the data are analysed, it appears the boys are generally more active than girls from an early age and that the activity levels of both sexes decline with age. A marked deterioration in physical activity is typical of both boys and girls as they move through secondary school.

There are no reliable data on children's and adolescents' physical activity patterns which pre-date 1980, however, an analysis of historical data on energy intake is of interest. Durbin (1992) pooled data collected from the 1930s to the 1980s and demonstrated a progressive decrease in the energy intake of adolescents in the United Kingdom. The body mass of the young people had not decreased and the methodology of data collection was consistent. The only conceivable explanation for the reduction in energy intake, which must reflect diminished energy expenditure, is that adolescents' physical activity has decreased over the last 50 years.

**Do Active Children Become Active Adults?**

The view that high levels of physical activity during childhood increase the likelihood of such participation as an adult has often been advanced. The hypothesis is intuitively plausible but the definitive study of physical activity tracking from childhood through adult life has yet to be carried out.

A recent English national survey of adults' fitness and physical activity reported that 25% of those active when aged 14 to 19 years were classified as "very active" adults compared with only 2% of adults classified active now who were inactive at the earlier age (Activity and Health Research, 1992). Thirty percent of the 6,000 adults surveyed were consistently in the same activity band at ages 14 to 19, 20 to 24 and their present age, thus indicating that adult activity patterns may have their origins in behaviour established during childhood and adolescence.
Three recent prospective studies have supported physical activity tracking (Glenmark et al., 1994; Kuh & Cooper, 1992; Raitakari et al., 1994). Kuh and Cooper (1992) examined the physical activity patterns of more than 3,300 men and women aged 36 years, who were members of the 1946 British national birth cohort study. They reported that adolescent characteristics which were positive predictors of high sporting activity during adult life included above average ability at school games and teacher assessed high energy expenditure at age 13 years. In a smaller Swedish study 62 males and 43 females were required to complete a questionnaire concerning physical activity during their leisure time at the ages of 16 years and 27 years (Glenmark et al., 1994). At the age of 16 years the subjects also underwent a series of physiological tests. The investigators reported that the major portion of the variation in level of physical activity in the women, but not in the men, could be predicted from physical characteristics, physical performance and activity levels at 16 years of age.

Perhaps the most persuasive evidence in support of physical activity tracking has emerged from a study of 961 Finnish youngsters, aged 12 years, 15 years or 18 years at baseline, who were followed for 6 years (Raitakari et al., 1994). Physical activity was assessed with a standardised questionnaire and an index was derived from the product of intensity, frequency and duration of leisure time physical activity. Significant tracking of physical activity was observed with 3 year correlations of the index ranging from 0.35 to 0.54 in boys and from 0.33 to 0.39 in girls. Tracking was better in older age groups. Approximately 57% of those initially classified as inactive remained inactive after a 6 year follow-up. The authors concluded that the level of physical activity tracks significantly from adolescence to young adulthood and that physical inactivity shows better tracking than does physical activity.

In summary, there is no scientific evidence to suggest that young people have low levels of aerobic fitness or that aerobic fitness has deteriorated over the last 60 years. Boys have higher levels of aerobic fitness than girls, at least from about 10 years of age, and sex differences increase as young people move through adolescence. However, sedentary lifestyles appear to be common and indirect evidence suggests that young people's energy expenditure has decreased over the last 60 years. Boys are more active than girls and girls' activity levels decline more rapidly than those of boys as they move from childhood through adolescence. No prospective study has followed children into adult middle age and beyond but the available evidence suggests that adult physical activity patterns may be established during childhood and adolescence. In particular physical inactivity tracks from childhood into adult life.

**Promoting Physical Activity**

The myriad interacting factors which may influence young people's physical activity are not fully understood but the consensus view is that no single correlate explains physical activity behaviour. Although acknowledging that physical activity behaviour is influenced by a variety of social variables and role models, I will focus on the role of the school and, in particular, physical education in promoting active living. This section is drawn from a more wide ranging discussion available elsewhere (Armstrong & Welsman, 1997).

All children attend school from an early age and the school setting provides perhaps the most promise for influencing young people's physical activity behaviour. A number of school-based intervention programmes have been mounted with the objective of increasing children's physical activity but they have met with only limited success, sometimes
because they were geared towards an outcome of enhancing physical fitness (reviewed in Sleap, 1990).

In schools, physical activity should not be divorced from other aspects of a healthy lifestyle and special provision should be made for a "whole school" cross-curricular approach to promoting healthy lifestyles. Science, home economics, physical education, health education, school meals, and school nursing staff should all be involved in a multidisciplinary, integrated approach.

The school should explore ways of using resources such as playgrounds and of making equipment (e.g., jump ropes) available at breaktimes in order to promote equitable physical activity which is not dominated by boys' games. Partnerships with families, physicians, and community organizations should be developed, facilities shared where appropriate, and school policy should be sensitive not only to current but also to post-school physical activity needs of its pupils.

The value of promoting enjoyable early life experiences of physical activity has been supported by several studies and primary school physical education is therefore a potentially important vehicle for fostering an appreciation of physical activity. The primary school should provide an ideal environment for promoting an active lifestyle but concerns have been expressed, at least in the UK, over facilities for physical education and access to fully qualified physical education teachers (Central Council for Physical Recreation and National Association of Headteachers, 1992). In primary schools it is unlikely that specialist physical education teachers will always be available but at the very least each school should identify a physical education curriculum leader with responsibility for the subject. The curriculum leader's continuing professional development in the subject should be supported through in-service courses and visiting specialists.

The primary school physical education curriculum which tends to focus upon individual motor skills and co-operative rather than competitive activities is generally very popular with children. Concerns have been expressed over the activity content of physical education lessons (Mota, 1994; Sleap & Warburton, 1992) and although there appear to be no significant gender differences in physical activity during structured aspects of lessons girls have been observed to be less active than boys during free play within lessons (McKenzie et al., 1995). However, although the provision of a high activity content should be an important component of physical education lessons it is much more important to build a foundation of motor skills and to make children's early activity experiences enjoyable in order to foster future participation.

The moderate to vigorous physical activity content of secondary school physical education lessons has been questioned (Klausen et al., 1985) but it appears that curriculum content and enjoyment and not high activity content are the most influential factors in developing positive or negative attitudes towards physical education (Luke & Sinclair, 1991). These factors appear to be particularly important to females less inclined to physical activity and point to the need to create programmes that capture students' interest.

Young people should be encouraged to internalise the motivation to be active so that when the extrinsic motivation of the teacher is removed they will continue with an active lifestyle. To achieve "activity independence" children and adolescents need to understand the principles underlying healthy activity and be taught how to become informed decision makers who can plan and implement individual activity programmes that can be periodically re-appraised and modified as they get older.
Competitive team games dominate the secondary school physical education curriculum in most European countries despite unequivocal evidence to show that, with the possible exception of football for boys, they are not transferring to out of school participation (Sports Council, 1995; Telemo & Silvennoinen, 1979). Competitive team games are a valuable component of the physical education curriculum. Many youngsters enjoy team sport and should be given the opportunity to fulfil their potential but young people need to be exposed to a balanced programme of competitive, co-operative, individual, partner, and team activities, thus laying the foundation for present and future physical activity behaviour. A competitive approach tends to focus on the few students with high ability and may alienate the majority of young people. Early maturing boys tend to excel but there is no evidence to suggest that early specialization is necessary for the nurturing of sporting talent. In fact early specialization may turn young people off lifetime physical activity, especially if through extrinsic teacher/coach domination they have not achieved "activity independence" (Armstrong, 1990).

A competitive ethos appears to be acceptable to most boys but, notably, less acceptable to low-exercising boys (Gentle et al., 1994). Many girls reject competition, even the high exercisers. Individual sports and activities are far more popular with girls than competitive team games (Sports Council, 1995). The dislike of many girls for team games should not be confused with disinterest in physical activity but team game dominance of the curriculum may well contribute to girls' low levels of physical activity. Physical educators need to take a reflective view of the balance, organization and presentation of their programmes in order to challenge the gender ideologies reflected in many physical education curricula (Armstrong & McManus, 1994).

Despite a recent and overdue change in emphasis from physical fitness to physical activity in physical education programmes many secondary schools still include compulsory fitness testing within their curriculum. Yet, tests that are suitable for use in the school environment and that provide valid and objective measures of fitness are not available. Fitness tests simply determine the obvious, at best only distinguishing the mature and/or motivated child from the immature and/or unmotivated child (Armstrong & Biddle, 1992). The use of norm tables confounds the issue of relative fitness because tables constructed on the basis of chronological age cannot be used to legitimately classify children at different levels of maturity. Furthermore, having different norms for boys and girls results in different expectations. Norms are based on performances rather than capabilities and if teachers accept lower norms for girls as reflecting acceptable performances, girls will tend to meet these lower expectations (Thomas & Thomas, 1988). Students generally view fitness testing unfavourably and a major contribution to negative attitudes towards physical education (Luke & Sinclair, 1991). Teachers must ask themselves why they are testing children's fitness, and if the answer is to classify children, then perhaps they would be better employed seriously addressing the problem of children's sedentary lifestyles.

Other factors which may provide barriers to adopting active lifestyles include the availability of private showering activities and the compulsory wearing of perceived unattractive "gym kit". Clothing has been identified as a determinant of negative attitudes for both males and females but it is a major problem for some girls since notions of femininity and body image are more intensely bound together for them. Looking good remains a significant motivator for girls' participation in physical activity. A dialogue between staff and students should be able to solve this perceived problem.
SUMMARY

There is little evidence to suggest that young people are unfit or that aerobic fitness has decreased over the last 60 years. However, many children and adolescents have sedentary lifestyles. Boys are more physically active than girls during childhood and girls' activity levels decline more rapidly than those of boys as they progress through adolescence. Inactive young people are unlikely to become active adults. The challenge is therefore to promote and foster active lifestyles from childhood to adult life. Physical educators are well-placed to meet this challenge but they must reflect on the balance, equity, organization and presentation of their curriculum and extra-curricular programmes. The future health of our children depends upon it.

REFERENCES


Physical Fitness, Physical Activity and Physical Education


Studying Teaching Effectiveness in Physical Education, Research Designs and Findings

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Abstract
Studies on teaching effectiveness, also labeled process-product studies attempt to answer a direct question: "What does make a difference between more and less effective teachers?" or "What are the relationships between the teaching process and pupil outcomes?". One alternative to the full-scale process-product paradigm has been Experimental Teaching Units (ETU) or ETU like studies. They were frequently used in physical education.

In summary, an ETU is characterized by: (1) a learning objective set forth by teachers; (2) a measure of pupil learning developed specifically to appraise the instructional content taught in the ETU which is administered before and after actual ETU lessons are taught (pre and post-test); (3) a teaching period; (4) systematic observation of selected teacher and pupil behaviors conducted during the actual ETU lessons. Two approaches were typically used to process data and to identify variables related to teaching effectiveness: (1) a correlational approach; and (2) a comparative approach. Their models will be described.

Overall, the research supported the role of two variables: (1) time-on-task and (2) feedback. The main impediments to the teaching effectiveness research are: the aptitude-treatment interaction. However, some inconsistencies have been found in research findings, especially about the relationship between teacher's feedback and student's learning gain. The mediating processes paradigm provides a framework for interpreting teaching effectiveness studies and making sense of inconsistent findings. This is the case for feedback. Students perceive the feedback differently from one another and sometimes not as the teacher intends. An example will be provided about student information processing of feedback information.

Implications of the process - product and mediating processes paradigms research for teachers will be emphasized.

In many human activities the quality of practices depends more or less on research and on the transformation of its results into application. Sport pedagogy is not an exception.

We need:
1. to draw a picture of the research on teaching effectiveness at various points of its development;
2. to evaluate the contribution of this research to the knowledge of the teaching process;
3. to examine how to put research findings into practice.
TEACHING APPROACHES AND STRATEGIES BASED ON THE STUDY OF THE TEACHING PROCESS

Teaching methods were frequently based on prescriptions arising from a more or less clear idea of what teaching should be, or from a vision of ideal teaching. Some laymen as well as professionals consider that good teaching is just a question of common sense with appropriate safety measures. Teaching physical education is frequently a domain where modes are seen as innovations. However, research completed in the two last decades has shown that scientific aspects of teaching are growing step by step.

Initially, I will describe the essential characteristics of research aiming at identifying teaching behaviours which present the strongest relationships to pupils learning outcomes by pupils. Two fundamental criteria, the time spent on task and feedback will be analysed more particularly in their role as intermediaries between the teacher action and the pupil acquisitions. The observations made in physical education classes will be confronted with criteria identified by teaching effectiveness research. In the two above mentioned fields of motor engagement and feedback, implications of research for practice, will be highlighted.

Two main components are included in my approach:
1. The identification of variables significantly related to students outcomes;
2. Confronting, on one side, these variables and teaching principles with, on the other side, the reality observed during teaching.

A descriptive approach to the teaching relationship presents at least three important functions and outcomes:
1. It facilitates the identification of permanent or temporary teacher or/and student behaviour;
2. It allows us to confront the views and concepts of theoreticians with the day-to-day life in the classroom;
3. It gives teachers an image of their teaching, by providing some objective feedback.

INTRODUCTION

It is particularly difficult to identify the criteria for teaching effectiveness. There are so many sources which provide variation and in addition a high degree of specificity, due to the influence of objectives, of educational settings, of subject matter taught, and many other uncontrolled or unknown influences. However, it is tempting to ask a direct question in order to find some answers as one looks at what is occurring during a teaching session: «Among the behaviours and strategies observed during teaching, is there any difference between the most and the least effective teachers?» This question can be asked another way: «Are there significant relationships between behaviours observed during teaching and pupil outcomes?»

During the last decade, teacher accountability and teacher effectiveness have received significant amounts of attention. The question, «What does make a difference between more and less effective teachers?», has been asked with increasing frequency. The art of teaching is influenced by so many factors, however, that the answer to this question cannot be fulfilled by identifying a single variable or even a limited series of variables. Successful teaching involves the orchestration of a complex set of variables and only a few of these variables have been identified consistently through research.
RESEARCH DESIGN

During the initial steps of this research in physical education, one alternative to the full-scale process-product paradigm has been Experimental Teaching Units (ETU) or ETU-like experiences. The ETU provides a small-scale process-product setting which enables the researcher to make reasonable guesses about important variables related to teacher effectiveness. ETU is a brief series of lessons on a specific topic that is of interest to the grade level of pupils to be taught by the teachers in the experiment. In ETU studies, the learning environment is frequently reduced in terms of time, space, number of pupils. ETUs are characterised by: (1) a learning objective set forth by teachers; (2) a measure of pupil learning developed specifically to appraise the instructional content taught in the ETU which is administered before and after lessons are taught (pre- and post-test); (3) a teaching period; (4) systematic observation of selected teacher and pupil behaviours conducted during the ETU lessons.

It is necessary to point out that consideration of learning objectives is only a fragmentary view of what teaching objectives could be. Educating children is more than teaching sports skills. Other objectives deserve to be pursued. Moreover, learning gains are not necessarily considered as priority objectives by teachers or by pupils.

However, two reasons are advanced to retain learning as a criterion:

1. Learning is one of the school missions and an objective in all subject matters, including physical education. The role of the school is not limited to providing recreation for the pupils. Physical education is not just another form of recess. The well-known formula about pupils «Busy, happy, and good» seems to be limited in scope.

2. The attitude of pupils towards the school is largely dependent on their success in subject matters taught. In his study of teaching effectiveness, Bloom (1979) found that attitude was responsible for approximately 20% of the final variance of pupil outcomes.

RESEARCH METHODOLOGY

Two approaches were typically used to process data and to identify variables related to teaching effectiveness: (1) a correlational approach; and (2) a comparative approach.

1. The correlational approach. Process-product studies intend to identify relationships between, on one side, teaching behaviours and strategies observed during the action in the gym and, on the other side, pupil outcomes.

2. The comparative approach. In this approach, comparisons are made for: (1) teachers whose classes are making the greatest progress with teachers whose classes are making the lowest progress (Carreir da Costa & Piéron, 1990a, 1990b; De Knop, 1983; Graham, Soares, & Harrington, 1983; Phillips & Carlisle, 1983; Piéron & Piron, 1981); (2) pupils learning gains. In that approach, behaviours of pupils with the highest learning gain are compared to behaviours of pupils with the lowest learning gain.

The model for analysis is relatively simple. It seeks an answer to the question «What makes a difference between more and less effective teachers?».
It is possible to review the ETU studies according to their main components: tasks to be learned by pupils (the content of the ETU), length of the teaching period, pupil and teacher characteristics and the size of the class taught.

FINDINGS

Findings of the ETU studies can be discussed as several topics including: improvement of pupil performance, role of variables articulated around the concept of pupil engagement, task presentation, and teacher feedback.

Improvement of pupil performance

Fortunately all the ETU studies showed some improvement of learners' performance. Several important points arose from conditions facilitating or impeding pupil improvement: (1) the appropriateness of task to pupil skill level; (2) the influence of the entry level of the pupil; and (3) the teacher's presence. A few studies used control groups practising under trial and error conditions without the presence of a teacher or did no practise at all (De Knop, 1983; Neto & Piéron, 1993). In each study, groups performing in the presence of an active teacher made significantly higher progress than trial and error groups. It is fortunate to observe that teachers play a leading role in favouring learning outcomes by pupils. It is not sufficient to provide pupils with opportunities to practice. It is necessary to organise these opportunities to make the engagement more intense and successful and to help pupils benefit from their practice.

Role of variables articulated around the concept of pupil engagement

Pupil engagement is considered as central in the discussion about teaching effectiveness. Based on findings from «Beginning Teacher Evaluation Study», Siedentop, Birdwell and Metzler (1979) have adapted the concept of «Academic Learning Time» to physical education teaching. They proposed ALT as a substitution variable to assess teaching effectiveness by class observation. I do not share this restricted view. Teaching is of such a complexity that it could not be expected to find a unique variable able to predict teaching effectiveness. Motor engagement time and Academic Learning Time (although the latter also uses a measure of task difficulty), are measures of actual pupil involvement during allocated time and is therefore a more stringent measure of what pupils actually do during a lesson. Most of the studies corroborated the importance of the time spent practising the criterion task or the number of practice trials. Pupils who learned more had teachers who provided them with more time to practice the criterion skill.

Phillips and Carlisle (1983) also found that engaged skill learning time was a distinguishing factor related to teacher effectiveness. In fact, they reported that teachers in the more effective group provided their pupils with more than twice the amount of engaged skill learning time than did the less effective teachers in their study. In the Carreiro da Costa and Piéron study (1990b), the profile of pupils' behaviours showed striking differences between the two classes lead by the most effective teacher and the least effective teacher. Although the amount of motor engagement time was slightly in favour of the least effective class, the specific motor engagement was dramatically higher in the most effective class: 8.2% vs. 2% of the functional time (time spent in the gym).
Considering this difference, it is easy to understand that learning gains were higher in the most effective class than in the least effective.

Pupil success when practising the criterion tasks was also observed in several studies. A higher success rate in specific pupils was evidenced in the high learning group when compared with the low learning group (Piéron, 1983). Success during engaged skill learning was also found more often in the classes of more effective teachers in the study by Phillips and Carlisle (1983).

**Teacher’s interventions**

**Teacher feedback**

Divergent results were reported concerning the relationships between teacher feedback and learning outcomes in ETU studies. Reworking her previous results, Yerg (1980) observed that on the one hand, feedback to a single pupil referring to the total movement was positively related to pupil achievement and on the other hand, detailed informative feedback was negatively related to pupil outcome on the same criterion. However, several studies showed a facilitating role for teacher feedback. Pupils practising in the more effective microclasses received a higher proportion of augmented feedback (Piéron, 1982) although it must be remembered that pupils in these classes also spent a higher proportion of time in actual practice. In learning a beginning balance skill, teacher feedback was found to positively influence pupil learning (Yerg & Twardy, 1982). The positive feedback was higher for more effective teachers in the volleyball unit (Phillips & Carlisle, 1983).

One interesting finding emerged from the study on tennis teachers, where feedback accounted for 11 to 16% of the total variance of final level in accuracy or skill and technique measures (De Knop, 1983).

Let us again refer to Carreiro da Costa and Piéron findings (1990a). Feedback issued by the most effective teacher was more specific and more appropriate than that by the least effective. This latter teacher issued one inappropriate feedback out of five. Total time spent in practice with teacher feedback had a significant positive correlation with pupil achievement (Silverman, Tyson, & Marrs Morford, 1988).

**Task presentation**

The clarity of a teacher’s presentation along with the amount of time teachers spent actually instructing a class were variables considered in several studies. Essentially the finding was that there is no clear relationship between either the clarity or conciseness of a teachers’ instruction and pupil learning. Future research efforts in this area probably need to focus more on the variables closely related to the quality of the teacher’s presentation, rather than on simple measures of time. Variables such as clarity, appropriate instruction and use of demonstration, may lead to a better understanding of the function of a teacher’s instruction in enhancing pupil learning.

**Pupils characteristics**

A study by Silverman (1985a, b) involving swimming underlined an important concept: the aptitude-treatment interaction. All pupils do not profit in the same way from their motor or cognitive engagement. This fact sends us back to the need for an indispensable
balance between the need for practice and the need for information to learn a motor skill. Silverman’s studies (1985a, b) could explain the presence or absence of the relationship between pupil engagement and pupil outcome. He investigated the relationship between pupil achievement, pupil engagement, and selected pupil characteristics of initial skill, previous experience, and sex in an ETU based on teaching the breaststroke to pupils ranging from 17 to 31 years of age. Instruction consisted of four 15 minute classes.

Aptitude-treatment interactions are present when individuals, near the end of a range of some human ability or characteristic, are affected differentially by alternate instructional interventions. An Aptitude-treatment interactions present when persons high in some aptitude profit most from one kind of instruction, while persons low in that aptitude profit from a different kind of instruction.

**GENERALISATION**

Thus far, some of ETU studies have been completed in physical education. Although there are variations in design, it is possible to review them according to their main components and to attempt to consider some generalisation from their findings. Tasks to be learned by pupils (the content of the ETU), length of the teaching period(s), pupil and teacher characteristics and the size of the class taught will be dealt with.

**Tasks.** In the development of process-product studies in physical education, a widening of the range of selected tasks was observed. Closed and open skills as well as simple and complex tasks were selected. Let us give a few examples. Different kinds of tasks have been selected from the sports of gymnastics, tennis, volleyball, swimming and golf.

**ETU length.** Very short in the first ETU completed (15 minutes), the ETU length was progressively increased. There is a strong trend to use a full teaching unit distributed over several weeks.

**Pupil and teacher characteristics.** Teachers, as well as pupils involved in the studies, differed strikingly, from undergraduate pre-service teachers to experienced teachers, from kindergarten children to elementary school pupils, and to physical education university freshmen majoring in physical education.

**Class size.** Classes varied from micro-setting size (3 or 4 pupils) to full class size (over 25 pupils).

**CONCLUSIONS FROM THE TEACHING EFFECTIVENESS RESEARCH**

The significance of this series of physical education ETU studies resides in the obvious fact that many findings are corroborative. The research designs and the independent and dependent variables in the studies reviewed were related, not identical, and yet they have produced confirmatory results.

In physical education teaching, four variables seem to play a determining role in pursuing educational objectives: time spent by pupils in motor activities, feedback, class management, and class climate:
1. Motor engagement time and time spent on task. Results from several studies showed that motor engaged time should be specific (Piéron & Piron, 1981; Carreiro da Costa & Piéron, 1990 a, b) and that activities should be performed at a high level of success (Piéron, 1982) to induce significant learning gains. The importance of success is clearly shown in process-product studies completed in the classroom. Time spent on task is seen as the mediating link between instructional teacher behaviours and pupil learning gains.

Activity time is also of prominent importance in other teaching objectives, for example those related to health effects. For a few years, in several countries like the United Kingdom, the United States, and Belgium ... to cite just a few, the effectiveness of physical education teaching has been questioned in relation to its health effects. A minimum level of duration and intensity is necessary to improve endurance. Activity patterns of children and the youth of today, move closer and closer to serious inactivity.

2. Frequent and quality feedback provided to pupils. In motor learning theory, feedback is seen as indispensable to a continuous progress. In teaching, feedback is far more complex than knowledge of results. Providing a better knowledge of pupils’ performance is the main objective of feedback in any educational setting. It is a permanent concern to help pupils to move towards excellence.

3. Classroom management. Maximising motor engagement time, providing pupils with frequent feedback is unattainable without an effective organisation. It facilitates management and discipline problems within a classroom.

4. Class Climate. Amongst its objectives, physical education intends to develop long term favourable attitudes and behaviours toward physical activities outside the school environment. Such attitudes and behaviours have an opportunity to build up only when motor and sport skills have been practised within a reinforcing climate created by teachers.

LOOKING INTO PHYSICAL EDUCATION CLASSES

To determine the implications for the practice, it is necessary to compare what one can usually observe in physical education classes and the criteria resulting from research, i.e., those that we have just highlighted. The observation will relate to the pupil’s behaviour, management of time and feedback. In order to better include and understand the role of motor engagement time and feedback, it is useful to call upon the paradigm of the mediating processes. They are intermediaries between the action of the teacher and pupils acquisitions. The focus of the mediating process research is on implicit processes that students employ to mediate instructional stimuli and produce learning outcomes (Levie & Dickie, 1973). In physical and sports activities, this focus appears too restrictive to me since motor engagement plays a particularly significant role in learning. The participation of mental processes presents two significant aspects: the motivation and the information processing, the latter presenting a cognitive character. Let us add that mediators related to the motivation constitute a base essential to the implementation of motor and cognitive mediators.

Student behaviour

Analysis of teaching physical education gathers various types of data leading to implications for reflective teaching and implementation:
1. Quantitative data informing on the level of student participation or the proportion of students engaged in physical activities;
2. Quantitative data on the level of student engagement in various educational or sport specific settings;
3. Quantitative data completed by information on the quality of engagement (failure - success ratio);
4. Qualitative descriptions of the type of participation in the tasks.

The first three kinds of information can be used in planning a session. They bring attention to organisational problems. Some sport specialties induce a very low student engagement. There is a need to search for other activities compensating for the momentary lack of movement. Knowing the types of participation, facilitates the identification of individual students creating discipline problems to teachers, or of other students ready to contribute to a favourable climate.

In fact, research emphasising student behaviour intends to match the quantitative aspects of the engagement with its quality linked to success in learning objectives or intensity in fitness objectives. The specificity of the task to learning objectives is of prominent importance. Data gathered through student/athlete observation is rich in information useful to teachers or coaches.

Objectives will be: (1) increasing functional time; (2) increasing time allocated to practice; and (3) increasing time spent on task.

It is necessary to keep in mind that any rise in student engagement time depends on the functional time (time effectively spent in the gym) and on the increase of allocated time to practice. Increasing functional time relies on student motivation towards activities. It is achieved through a tough limitation on time spent in the dressing room or spent on administrative routine like roll call. Increasing time allocated to practice is achieved through careful planning, short periods of accurate task presentation. Pre-requisite are the knowledge of subject matter and the adequate pre-interactive decisions, the control of classroom activity (frequent spotchecking), and regular individual or group interventions to increase the activity level, and establishment of positive climate in the classroom (Piéron & Emonts, 1988).

Observing deviant student behaviours and teacher’s response is also a source of useful data to implement preventive measures of keeping control of the class.

A second objective will be increasing functional time by: motivating students, decreasing duration of administrative routine, and limiting time spent in the locker room (dressing room).

**TIME ALLOCATED TO PRACTICE**

Once in the classroom, the teacher presents, justifies and organises the tasks. Students prepare the equipment. All these operations necessitate time which is to be subtracted from the functional time. If teachers speak a lot, if they need more time to organise the class (it is always the case when the planning is not carefully done), then time allocated to practice, games or exercise is dramatically decreased.
It could be recommended that instruction time be kept close to 10% of class time, and transition and organisation time be restricted to 10-20% in such a way that time allocated to practice be 70%.

A third set of objectives will be increasing time allocated to practice by: limiting the duration of task presentation, decreasing time spent in transition, and increasing time spent on time.

Several teaching strategies and interventions contribute to increased time-on-task. Their effectiveness is not automatic. It is necessary to ensure regular control of the engagement level of students.

Selecting the means or content

Frequently, teachers select activities corresponding to an average ability level of their students. This average level does not necessarily correspond with students needs. There is a possibility of finding a more appropriate solution between the same activity for everybody and unrealistic individualisation. The task teaching style in Mosston’s spectrum could be an appropriate approach to solve the problem. The same activity to everyone, especially in gymnastics, causes students to frequently modify the task or even stop the activity.

Planning carefully: focusing on the organisation or management

The objective will be a reduction of the amount of time students spend in organisational, transitional and non-academic tasks. Let us give a few examples: teach specific organisation forms, use stable working groups or teams, and control the initial activity.

Specific interventions in view to enhance the activity

Interventions towards the class: bringing the students together and re-teaching the task, getting the students’ attention and providing a group or class feedback, refocusing attention towards criteria essential to success in learning, and modifying slightly the task and asking for a few trials.

Individual intervention: using personalised and non-threatening interventions.

FEEDBACK

Several teachers’ interventions or skills have been thoroughly investigated. Feedback is the typical example. Feedback is worthy of more careful consideration. The teacher regards it as very meaningful. It aims at improving the pupil’s performance. Often it is viewed as an indicator of teachers’ enthusiasm. It implies regular teacher and pupil information processing. Task presentation, class management and control have started to be of some concern to researchers. However, only one thoroughly investigated area of research will be dealt with. Studies on feedback and their implications to practitioners will be analysed.

In observation linking teacher behaviour, students behaviour and students learning gains, more effective teachers have provided their students with more frequent specific feedback
(Carreiro da Costa & Piéron, 1990b; Phillips & Carlisle, 1983; Piéron & Piron, 1981). Two teachers located at the extreme ends of a continuum of teaching effectiveness differed in the appropriateness of their feedback. However, the relationship between observed feedback and the improvement of performance is not a straight one. To benefit from feedback, it is necessary that the individual student be able to understand the message, to process it and be able to put it into practice.

FUNCTIONS OF EXTRINSIC FEEDBACK

Extrinsic feedback corresponds to the definition of Fishman and Anderson (1971) «a teaching behaviour dependent upon the motor response of one or more students and intended to provide information related to the acquisition or performance of a motor skill». It is provided by an external source, most frequently by the teacher. Other students may provide feedback as well. Feedback can be verbal or non-verbal. Feedback has two main functions:

1. As information to correct errors. It bears a message related to performance errors and to the most appropriate ways to correct them: identifying correct parts in the movement, explicating the origins of errors, describing the necessary means to implement the corrections or developing reasons to change;
2. As reinforcement to strengthen correct performance. Feedback reinforcing a response increases the probability that it will happen in a similar condition in the future. In this case, reinforcement and motivation are associated.

Feedback is issued after a series of teacher decisions. Within this decision making process, two aspects are of special relevancy: identification of performance errors and delivery of the message.

Delivering feedback comprises several elements forming a chain: observing pupil in such a context that performance error can be identified and the nature and the cause of the error can be determined. Several factors influence this whole process, more especially the pupil observation. There seems to be general agreement in models and paradigms of the teaching process that observation of pupil learning behaviours should be an important skill for teachers. The content of the feedback message depends largely on the teacher’s ability to analyse the skill, to determine those factors critical to proficiency at a particular stage of learning, to identify the aspects of the response which are preventing the learner from attaining the skill objectives and to provide feedback related to these factors (Barrett, 1979a, b, 1983; Craft, 1977; Hoffman, 1983).

Observation is a special skill; it involves more than just watching what is going on. Alertness, sensitivity, and ability to identify and to assess a range of behaviour and relationships, are crucial components. A key to useful observation is knowing what should be seen. Diagnosis skill or skill analysis is defined as the act identifying errors in the learner’s performance. This is considered an essential competency for the physical education professional. One interesting question concerns the relationship between kinaesthetic experience and diagnostic ability.
IDENTIFICATION OF PERFORMANCE ERRORS

It comprises several elements forming a chain: observing a student in such that performance error can be identified and determining the nature and the cause of the error. Several factors influence this whole process, more especially the student observation.

1. Observation of student’s performance. There seem to be general agreement in models and paradigms of the teaching process that observation of pupil learning behaviours should be an important skill for teachers. The content of the feedback message depends largely on the instructor’s ability to analyse the skill, to determine those factors critical to proficiency at a particular stage of learning, to identify the aspects of the response which are preventing the learner from attaining the skill objectives and to provide feedback related to these factors (Barrett, 1979a, b, 1983; Craft, 1977; Hoffman, 1983). Observation is a special skill: it involves more than just watching what is going on. Alertness, sensitivity, and ability to identify and to assess crucial behaviour and relationships are crucial components. A key to useful observation is knowing what should be seen.

Research in this area is based on hypotheses advancing that the teacher’s diagnostic skill depends on:
1. his/her own skill in the specific motor ability taught;
2. his/her knowledge of this skill.

It was evidenced that the diagnostic skill necessitates both a thorough knowledge of the subject matter and a personal practical experience (Girardin & Hanson, 1967; Inwold & Hoffman, 1983; Harari, 1986; Harari & Siedentop, 1990). It was also shown that it was possible to acquire this skill through a specific preparation (Kniffen, 1985). This skill is hardly generalizable, that means that transfer to other subject matter is not automatic (Biscan & Hoffman, 1976).

2. Determining the nature and the cause of the error. Immediately after identifying the error, it is necessary to determine the nature and the cause of the error. Errors can be caused by a lack of fitness, some perceptual deficiency (for example in identifying ball trajectories), psycho-social factors, etc.

3. Decision making. After having identified an error, the teacher has to decide whether feedback is necessary or not. When deciding to react, the teacher is confronted with another question: Does the student need more practice or additional information concerning his/her performance? If the learner needs more practice, the teacher can react by praising or encouraging.

4. Influencing factors. Problems identified were: concentration, some inability to maintain a focus on what the teacher was observing for long periods of time, type of movement response anticipated, ability level of students, number of students, speed and repetition of movement, and lack of visual strategy.

INTERVENTION

This step is close to the end of the feedback chain. The question is reinforcement or information. Professional skill is the ability to match the instructional strategy and the
error. Piéron and Cheffers (1988) have summarised a large part of the descriptive research on feedback. I shall emphasise the most important points.

1. What's going on in teaching. The descriptive approach of research on teaching provided much data on feedback in teaching. Some of these pictures are bleak (low rate of feedback or predominantly negative feedback), some are encouraging (frequent, positive, and varied).

2. Implementing feedback. When providing feedback three possibilities are considered:
   (1) Providing feedback during the performance. The risk is high that the student is more interested in his/her performance than in the information.
   (2) Providing feedback immediately after the performance. Undoubtedly, it is the best moment to deliver the message, gain the attention or approximate to the student and deliver the message.
   (3) Providing retarded feedback.

3. Varying the message. Feedback can be provided under different points of view: (1) the intent; (2) the direction; (3) the form; and (4) the referent. (General - specific). It is evident that teachers should be able to give various types of feedback to meet individual student needs and to adjust to their level of performance and understanding. The intent of feedback is probably one of the most important dimensions being studied in the multidimensional approach of informative feedback. Definitions given by Fishman and Tobey (1978) can illustrate this dimension of studying augmented feedback. It intends to provide:
   (1) an appraisal of the performance of a motor skill (evaluative feedback);
   (2) an account of the performance of a motor skill (descriptive feedback);
   (3) an analogy to the performance of a motor skill (comparative feedback);
   (4) instruction for the subsequent performance of a motor skill (prescriptive feedback);
   (5) an attitudinal or motivational set toward the performance of a motor skill (affective feedback).

4. Following the message. Issuing a feedback message is not the final step of a feedback chain. It is necessary to give students the opportunity to make other adjustments, and for the teacher to check student perception of the message and to observe apparent changes in performance.

Teaching effectiveness relies on numerous criteria according to objectives set forth. Facilitating learning is a worthy objective necessitating on the one hand, a successful practice of motor and sports tasks and on the other hand individual information on his/her performance (feedback). Practical means to enhance those two aspects of teaching and coaching are proposed.

Some inconsistencies were observed in the conclusions of some process-product studies about the role of feedback in real teaching situations. To improve the understanding of the feedback contribution to learning outcomes, it is indispensable to consider both qualitative and quantitative aspects of feedback. Until now, only quantitative and structural aspects of feedback have been investigated. The appropriateness of the message is still absent from this research.

Affective and cognitive dimensions of feedback were rarely accounted for in descriptive and process-product studies. Lee and Solmon (1992) recommended a call on the paradigm of the mediating processes to explain part of the inconsistency of research findings on feedback. Whatever its quality, teacher's feedback must be processed by pupils. As any
kind of message, the information processing of feedback must pass through some selection filters. The learner uses short and long term memory to fulfil this selection. That is the cognitive dimension to be analysed. Another aspect to consider is the affective dimension depending on motivation and/or causal attribution (Martinek, 1988).

In quasi-experimental conditions, it was possible to observe that a relatively high proportion of feedback was not correctly reported by pupils or at least badly retained (Carreiro da Costa, Marques da Costa, Diniz, & Piéron, 1996; Cloes, Moreau, & Piéron, 1990). Attribution and interpretation bias were observed when analysing the perception of feedback in natural teaching conditions (Delens, Renard, & Swalus, 1987; Martinek, 1988).

For a better understanding of some difficulties which occur in the relationships between the teachers’ message and the modification of pupil’s performance, it is good to refer to the paradigm of the mediating processes. A study on the comprehension and the memorising of the teacher message by the pupil can illustrate the encountered difficulties. This study leads to several implications for the teacher. It purposes were the following:

* To assess what the pupil receives, processes, and keeps in memory from the information feedback provided by the teacher.
* To identify the influencing factors of the process of receiving, processing, and memorising of the feedback. They are related to the feedback and pupil’s characteristics.

The teachers involved in this study were two male teachers with more than 5 years of experience. They have the minimal material conditions to teach gymnastics and basketball skills. They work in indoor facilities. They have a good command of both subject matter to be taught. Pupils were 45 (23 boys and 22 girls). They were part of two well differentiated classes (grade 6 and 9). In grade 6, most of pupils were 11-12 year-old, in grade 9, they were 14-16 year-old. All of them took part in all teaching and evaluation lessons. Each teacher gave two lessons in each subject matter, in gymnastics and basketball, i.e., a total of four. Lessons lasted 50 minutes. The lesson planning was totally the teacher’s responsibility.

The main principle for the gathering of data relied on the need to compare the pupil’s perception of feedback with the feedback effectively issued by teacher. All lesson were video-taped. Recordings focused on the one hand upon the complete group of pupils and on the other hand on the teacher. Teachers’ verbal interventions were recorded through a wireless microphone. Data related to pupils came from an interview and a questionnaire administered at two moments of the lesson:

1. Each time a pupil received feedback, he/she was immediately asked a question which was always the same: «What did the teacher tell you?». The answer was audiotaperecorded. It is thought that the intervention of the researcher, as discreet as it could be, was a kind of intrusion in the class. To keep the level of intrusion at a minimal level, pupils were previously accustomed to the technique during trial lessons. The researchers were introduced as temporary helpers of the teachers.

2. At the end of the lesson, a questionnaire was administered on an individual basis to assess the level of pupil satisfaction. An interview aimed at collecting information to assess the capacity to evoke the information provided by teacher. The question was the following: «When you performed the task (labelling the task), What did the teacher tell you?»

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Studying Teaching Effectiveness in Physical Education, Research Designs and Findings
Feedback characteristics were analysed under the three following aspects:

1. Extent, i.e., the number of words in the message;
2. Amount of information (ideas) related to critical components of the task contained in feedback;
3. Density, the ratio between the extent and the amount of information in the message.

The feedback immediate coherence averaged 56.9% in gymnastics and 60.2% for the delayed measure. The total decrease in retention was 16.1% in gymnastics and 13.5% in basketball. The better retention of the message in basketball could be due to a lower complexity of its feedback as it was seen from data in ideas and words.

It is understandable that there was a loss of information between the two moments of collecting data on the pupils’ report of feedback. The extent of information lost varied largely according to the feedback type and structure. It was observed that:

1. The feedback whose loss of retention was the most limited, from 15 to 20%, was prescriptive-tactile-auditive feedback, immediately followed by descriptive-auditive feedback.
2. Prescriptive structures were more rapidly forgotten than descriptive structures. The first decrease from 55.5 to 39.5%; i.e., a loss of 16%. Descriptive-auditive feedback lost 13.6%, decreasing from 68.4 to 54.8%.
3. Simple structures (exclusively verbal) were forgotten quicker than mixed (auditive-visual and auditive-tactile feedback).

In all lessons, pupils behaved differently according to the types and structures of feedback. At both moment of recollection of feedback, descriptive-auditive feedback followed by descriptive-audio-visual feedback had the highest coherence. At the bottom of the ranking were the prescriptive-auditive-tactile feedback during the lesson and audio-visual feedback at its end.

In synthesis:
1. Episodes of very clear and short feedback were evoked with a high coherence.
2. Episodes of feedback comprising many words and ideas were related with a low degree of coherence.
3. The repetition of information, even with different meaning units made easier the process of memorisation.
4. In feedback episodes wherein the teacher provide various information, pupils succeed to report only on one or two. The information reported is usually at the beginning or at the end of teacher’s talk.
5. Visual and kinaesthetic information is frequently badly perceived or reported incorrectly.
6. Inaccurate and baldly structured feedback is frequently misunderstood and poorly reported.

**IMPLICATIONS FOR TEACHING**

To facilitate learning outcomes, feedback should:
* be pertinent and appropriate, i.e., translate a correct diagnosis adapted to the skill level of the pupil and intervening on key elements of the skill;
* enable a clear confirmation with the general pattern of skills to be learned;
* deal with a limited number of items and criteria;
be structured in such a way that items are ranked according to an importance scale. The most important aspects should be presented at the beginning or at the end of the message.

* not be accompanied by «distracting» information or activities such as dealing with other skills. The focus must be on what is actually performed;

* be coherent with pupils needs, and motor abilities and adapted to the pupil’s possibilities of information processing.

In conclusion, research on teaching effectiveness in physical and sports activities highlighted criteria concerning the daily life of the class. The observation of real classes frequently shows that these criteria are not completely respected and that there are means of improvement that teachers could implement in their everyday life.

It appeared clearly that the teacher’s action can induce learning gains for the pupil through the intervention of mediators, in particular the time spent on task and feedback. Both remain under the control of the pupil’s motivation.

REFERENCES


Maurice Piéron


60 ICPE 2000 Proceedings
Nutritional Status, Problems and Strategies of Chinese Students

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Abstract

Nutritional status of Chinese students has been improved. However, malnutrition and nutrition excess still exist.

1. Data based on "Standard weight for Height" showed that students in normal nutritional status was 39.6%; Malnutrition and low weight: 32.6%; Overweight and obesity: 7.7%. Recent Investigations showed improvements. A trend indicates that the prevalence of malnutrition has been decreasing, obesity has been increasing.

2. The main nutritional problems were on energy, protein, calcium, iron and some vitamins. Average prevalence of obesity in students has increased from 1% to 3-4%, even to 10% in some large cities. Energy deficiency has been found in few impoverished areas, e.g., the number of emaciated children was 1.4% - 3.9% in 4 counties of He-Bei province which formed 23.7% of growth retardation. The incidence of iron deficiency anemia was 10-45%. Vitamin A, B1, B2 insufficiencies were common. Investigation of physically active students with better economic support showed excess protein and fat, insufficiency of calcium, iron, zinc, vitamin A and B1.

3. Strategies include carrying out nutritional education, promoting exercise, improving arrangement of physical education lessons, encouraging intakes of milk and soybean products, extending nutritional lunch at schools, and training the people related to students’ health to assort foods for meals scientifically. Governmental support and policies are needed for improving nutritional status of students.

Nutritional status is not only the basis for health, but also the most important factor for growth and development, and the capacity to accomplish the physical and mental school work of students.

Nutritional Status shown by Growth and Development: Nutritional status of Chinese students has shown improvement by the evidence of four national broad scope investigations on growth and development, and body constitution from 1985 to 1995 (Table 1). The body weight and height of Chinese students 7-18 years of age increased significantly and continuously under the overall improvement of the living standard. Average height and weight increases were 3.09cm and 2.5Kg, respectively, and the fitness level improved as well, e.g., performance score of 50m run of students improved 0.20 seconds and standing long jump increased 9.51cm in average. Besides, the distinction between city and rural areas showed a trend of gradual decrease, and the age of puberty
had shifted up 8 months per every 10 years. Data also showed that the body constitution further improved in the recent 10 years (National Education Committee, 1996a). The average menarche of Han nationality city girls was 13.7 years of age and it was 13.8 years of age for rural area girls (Ye, 1994).

Table 1: Improvements of Body Constitution of Chinese Students of 7-17 Years of Age from 1985 to 1995

<table>
<thead>
<tr>
<th>Index</th>
<th>City Male</th>
<th>Female</th>
<th>Rural areas Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ht (cm)</td>
<td>+2.93</td>
<td>+2.26</td>
<td>+3.63</td>
<td>+3.10</td>
</tr>
<tr>
<td>Wt (Kg)</td>
<td>+4.52</td>
<td>+2.98</td>
<td>+1.34</td>
<td>+2.13</td>
</tr>
<tr>
<td>Chest measurement (cm)</td>
<td>+1.99</td>
<td>+1.32</td>
<td>+0.19</td>
<td>0.11</td>
</tr>
<tr>
<td>Speed 50m (run sec)</td>
<td>0.10</td>
<td>-0.10</td>
<td>-0.32</td>
<td>0.27</td>
</tr>
<tr>
<td>Standing Long Jump (cm)</td>
<td>+6.15</td>
<td>+3.25</td>
<td>+10.79</td>
<td>+7.83</td>
</tr>
<tr>
<td>Stretch body upwards (times)</td>
<td>+0.85</td>
<td>----</td>
<td>-1.64</td>
<td>----</td>
</tr>
<tr>
<td>Lift body upward (times)</td>
<td>----</td>
<td>+5.74</td>
<td>----</td>
<td>+10.88</td>
</tr>
</tbody>
</table>


A report from Shan Dong province showed that the increase of height and chest measurement of Chinese children in 39 years was similar to that of the whole nation; but the average weight increase was less than the data of the whole nation, (Table 2) (Zhang, 1996).

Table 2: Increase of Height, Weight and Chest Measurement of Children of Ji-Nan in Shan-Dong Province from 1956 to 1995

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ht (cm)</td>
<td>10.83 (2.78/10 Yr)</td>
<td>9.74 (2.43/10 Yr)</td>
</tr>
<tr>
<td>Wt (Kg)</td>
<td>9.19 (2.36/10 Yr)</td>
<td>5.12 (1.3/10 Yr)</td>
</tr>
<tr>
<td>Chest measurement (cm)</td>
<td>7.62 (1.95/10 Yr)</td>
<td>4.64 (1.19/10 Yr)</td>
</tr>
</tbody>
</table>


Comparison of the data of teenagers at different ages between Hong Kong and inland cities showed that the cardiopulmonary endurance, muscular strength and endurance performance levels were better in teenagers of inland students. Reasons were attributed to the set up of school courses, frequency of participation in exercise, use of communication tools, and diet composition (Hong, Chan, & Wang, 1997), e.g., inland children have two hour of physical exercise lesson per week and 20 minutes of set up exercise during study break, and regular time for cycling and step activity. Besides, the diet of Hong Kong children had problems of high protein, high fat, low carbohydrate, and less vegetables. As comparing the growth and development data of Chinese children with those of Japanese and Canadians showed that the height, weight and chest measurement of Chinese children fell behind those of the same aged Japanese students. With regard to the exercise capacity, data also showed that the performance capacities of the 50m run, standing long jump, stretch body upwards, and lift body upward were better in Japanese and Canadian students (Ji, 1996), but the performance of standing high jump was better in Chinese students. These differences were attributed to multiple causes, however attention on nutrition and physical exercise of students should be stressed (Ye, 1994; Hong, Chan, & Wang, 1997).
Evaluation of nutritional status of Chinese students based on the "Standard weight for Height" showed that the total composition of normal nutritional status was 59.6%; malnutrition and low weight: 32.6%; overweight and obesity: 7.7% in students of 7, 9, 12, 14, and 17 years of age in 1995 (Table 3-5). These data indicated that Chinese students are facing both the problems of malnutrition and nutritional excess.

### Table 3: Current Nutritional Status of Chinese City Students (Han Nationality) Evaluated by "Standard Weight for Height" in 1995 (%)

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Mal-nutrition</th>
<th>Low Wt</th>
<th>Nutrition Insufficiency</th>
<th>Normal</th>
<th>Over wt</th>
<th>Obesity</th>
<th>Nutrition Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0.8</td>
<td>21.2</td>
<td>22.0</td>
<td>68.7</td>
<td>6.4</td>
<td>3.0</td>
<td>9.4</td>
<td></td>
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<tr>
<td>9</td>
<td>1.9</td>
<td>22.2</td>
<td>24.1</td>
<td>61.9</td>
<td>8.1</td>
<td>5.9</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3.5</td>
<td>26.8</td>
<td>30.3</td>
<td>56.3</td>
<td>5.0</td>
<td>8.5</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>3.3</td>
<td>28.8</td>
<td>32.1</td>
<td>56.1</td>
<td>4.9</td>
<td>6.8</td>
<td>10.7</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>11.7</td>
<td>17.2</td>
<td>28.9</td>
<td>64.6</td>
<td>2.6</td>
<td>3.9</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7</td>
<td>2.3</td>
<td>29.1</td>
<td>31.4</td>
<td>61.6</td>
<td>4.9</td>
<td>2.1</td>
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<tr>
<td>9</td>
<td>4.5</td>
<td>30.8</td>
<td>35.3</td>
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<td>9.1</td>
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<td>12</td>
<td>6.4</td>
<td>27</td>
<td>33.4</td>
<td>53.7</td>
<td>8.3</td>
<td>4.6</td>
<td>12.9</td>
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<td>14</td>
<td>10.5</td>
<td>32.3</td>
<td>42.8</td>
<td>47.3</td>
<td>6.5</td>
<td>3.6</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>10.3</td>
<td>47.5</td>
<td>57.8</td>
<td>36.7</td>
<td>3.9</td>
<td>1.7</td>
<td>5.6</td>
<td></td>
</tr>
</tbody>
</table>


### Table 4: Current Nutritional Status of Chinese Rural Area Students (Han Nationality) Evaluated by "Standard Weight for Height" in 1995 (%)

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Mal-nutrition</th>
<th>Low Wt</th>
<th>Nutrition Insufficiency</th>
<th>Normal</th>
<th>Over wt</th>
<th>Obesity</th>
<th>Nutrition Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>1.2</td>
<td>21.9</td>
<td>23.1</td>
<td>73.6</td>
<td>2.6</td>
<td>0.9</td>
<td>3.5</td>
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<tr>
<td>9</td>
<td>1.3</td>
<td>23.3</td>
<td>24.6</td>
<td>70.5</td>
<td>3.4</td>
<td>1.6</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3.2</td>
<td>27.4</td>
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<td>14</td>
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<tr>
<td>17</td>
<td>9.4</td>
<td>16.2</td>
<td>25.6</td>
<td>70.3</td>
<td>2.6</td>
<td>1.6</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2.2</td>
<td>29.1</td>
<td>31.3</td>
<td>66.0</td>
<td>2.1</td>
<td>0.6</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2.9</td>
<td>30.6</td>
<td>33.5</td>
<td>62.5</td>
<td>3.4</td>
<td>0.8</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>3.8</td>
<td>27.5</td>
<td>31.3</td>
<td>59.6</td>
<td>6.9</td>
<td>2.1</td>
<td>9.0</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>8.7</td>
<td>30.1</td>
<td>38.8</td>
<td>53.7</td>
<td>5.8</td>
<td>1.7</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>5.6</td>
<td>41.8</td>
<td>47.4</td>
<td>48.0</td>
<td>3.9</td>
<td>0.7</td>
<td>4.6</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Average Current Nutritional Status of Chinese Students (Han Nationality) Evaluated by "Standard Weight for Height" in 1995 (%)

<table>
<thead>
<tr>
<th>Age</th>
<th>Malnutrition</th>
<th>Low Wt</th>
<th>Nutrition Insufficiency</th>
<th>Normal Wt</th>
<th>Over Wt</th>
<th>Obesity</th>
<th>Nutrition Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>4.8</td>
<td>27.8</td>
<td>32.6</td>
<td>59.7</td>
<td>4.9</td>
<td>2.8</td>
<td>7.7</td>
</tr>
</tbody>
</table>


Comparing the data of nutritional status between students of cities and rural areas showed that students in normal status are more and students in nutritional excess and malnutrition were less in rural areas than those of cities, thus suggesting that nutritional intervention should be stressed in cities (Table 6). According to a recent investigation on the change of nutritional status, students in normal nutritional status increased in the recent years as compared with that of 1985. The average composition of normal nutritional status is 74.23%, the incidence of malnutrition has been significantly decreased, and obesity significantly increased year after year. Malnutrition was significantly more prevalent in girl students as compared with boys (23.89% vs 15.86%). This is due to a preference for particular foods and the pursuit of a slim body shape of girl students. The malnutrition was mostly revealed during the ages of 11-14 (the second growth spurt period) which implicated that the energy expenditure is more than intake, thus causing the increase of malnutrition (Pan & Shou, 1999; Ju, 1999). This finding calls attention to the need for nutrition education during this fast growing period.

Table 6: Comparison of the Composition of Nutritional Status between City and Rural Area Students in the Whole Nation (%)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Area</th>
<th>Malnutrition</th>
<th>Low wt</th>
<th>Nutrition Insufficiency</th>
<th>Normal Wt</th>
<th>Over Wt</th>
<th>Obesity</th>
<th>Nutrition Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>City</td>
<td>4.2</td>
<td>23.3</td>
<td>27.4</td>
<td>61.5</td>
<td>5.5</td>
<td>5.6</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>3.5</td>
<td>22.8</td>
<td>26.3</td>
<td>68.4</td>
<td>3.7</td>
<td>1.6</td>
<td>5.3</td>
</tr>
<tr>
<td>City--rural</td>
<td>+0.7</td>
<td>+0.5</td>
<td>+1.1</td>
<td>-6.9</td>
<td>+1.8</td>
<td>-4.0</td>
<td>+5.8</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>City</td>
<td>6.8</td>
<td>33.3</td>
<td>40.1</td>
<td>51.0</td>
<td>6.1</td>
<td>2.9</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>4.6</td>
<td>31.8</td>
<td>36.5</td>
<td>57.6</td>
<td>4.4</td>
<td>1.2</td>
<td>5.6</td>
</tr>
<tr>
<td>City--Rural</td>
<td>+2.2</td>
<td>+1.5</td>
<td>+3.6</td>
<td>-6.6</td>
<td>+1.7</td>
<td>-1.7</td>
<td>+3.3</td>
<td></td>
</tr>
</tbody>
</table>


Data on the dynamic change of nutritional status of Chinese students showed that the composition of malnutrition and low weight, and over-weight and obesity all increased, and composition of normal nutrition decreased, but there is indication that over-weight and obesity were the main trend. This suggests that although the living situation is greatly improved, nutritional education and intervention for students and their parents should be an important and urgent strategy (Table 7) (Ye, 1994; Hong, Chan, & Wang, 1997).
Table 7: The Dynamic Changes of Nutritional Status Statistics of Chinese Students (Han Nationality) from 1985 to 1995 (%)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Malnutrition &amp; Low Wt</th>
<th>Normal Nutrition</th>
<th>Over Wt &amp; Obesity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>26.9</td>
<td>22.2</td>
<td>121</td>
</tr>
<tr>
<td>Female</td>
<td>38.3</td>
<td>34.8</td>
<td>109.9</td>
</tr>
</tbody>
</table>


**Main nutritional problems:** Results of a number of nutritional investigations and studies on Chinese students showed that the main nutritional problems were on energy, protein, calcium, iron and some vitamins.

- **Energy:** The majority of Chinese students have adequate energy status, but there are energy insufficiency and excess problems as shown on Table 3-5.

The incidence of overweight and obesity were lower and malnutrition higher in rural area students. Data also showed a "Two Peak Phenomenon" which indicated on one side that the prevalence of marginal malnutrition in girls, especially during the rapid growth puberty period, was high. On the other hand, the prevalence of overweight and obesity was high in boys. The prevalence of obesity has been increasing year after year in 6-22 years aged students. Average prevalence of obesity was 1% in China during previous years, but it reached 3-4% and even to 10% in some large cities. A recent investigation on 22,312 children and adolescents of 7-18 years in six cities of Shan-dong province showed that the average prevalence of obesity was 5.44% (Zhang, 1997). Surveys on 23,424 students of Dalian city reported that the prevalence of simple obesity was 8.62% (Guan, Li, & Chen, 1998). Causes of obesity of Chinese students are mainly related to overeating, unreasoning diet composition with high amount of dietary fat, and deficiency of exercise/physical activity. Hazards of obesity in childhood were not only limited to the induction of disturbance of carbohydrate and lipid metabolism, reduction of cardio-respiratory functions, but also the inclusion of thyroid function and intelligence index, behavioral changes (Guan, Li, & Chen, 1998; Zhang & Li, 1996; Collaborative group of child care of GuangZhou Railway Company, 1997), and the future onset of adult obesity and chronic diseases (Zhang & Li, 1996; Guo, Li, & Ma, 1997).

On the other side, energy deficiency has been found in a few impoverished areas, e.g., the prevalence of emaciated children was 1.4%-3.9% in 4 counties of He-Bei province which formed 23.7% of growth retardation (Shen, Wang, Zhao, & Wang et al., 1996), yet the incidence of very serious malnutrition was less than 1% in China (Xue, Chen, & Ling, 1994). One of the main causes of malnutrition of Chinese students was that about 10% of the primary school students quit breakfast and took unreasoning composition of dietary energy (Ye, 1994). Fasting may induce hypoglycemia which not only affects health, but also influences the excitability of the brain and thus causes children to not do well in their studies (Ke & Yang, 1997).

- **Protein nutrition:** Data on the status of protein nutrition was varied in different areas. Protein intakes for most of the students reached 70%-90% of the RDA, but protein source was mainly from plant foods, protein from soybean was around 15%-20%, and the source from animal foods was about 14%-23% of the total (Zhang, An, Sun, & Li, 1997; Han, Kang, & Wang, 1999; Yang & Yang, 1997). Protein intake of students in large cities has
reached to >85%–106% of the RDA. Besides, the quality was better (Hong, Wang, Shen, & Cui et al., 1999; Shi & Li, 1999). Protein nutrition status of the very active students in amateur sports schools who have dietary subsidy was in excess, protein energy reaching to 13%–25% of the total, and >1/3 of the protein was from animal foods (Table 8). It is clear that protein nutrition of Chinese students also showed problems of nutrition insufficiency and excess.

**Table 8: Average Intake of Macro-nutrients of Students in Amateur Sport Schools**

<table>
<thead>
<tr>
<th>Sports</th>
<th>Protein Intake</th>
<th>Fat Intake</th>
<th>CHO Intake</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g/d</td>
<td>%</td>
<td>g/d</td>
<td>%</td>
</tr>
<tr>
<td>WuShu</td>
<td>M 185</td>
<td>18.6</td>
<td>188</td>
<td>48.8</td>
</tr>
<tr>
<td></td>
<td>F 173</td>
<td>21.1</td>
<td>174</td>
<td>39.1</td>
</tr>
<tr>
<td>Judo</td>
<td>M 183</td>
<td>15.0</td>
<td>289</td>
<td>50.9</td>
</tr>
<tr>
<td></td>
<td>F 142</td>
<td>19.9</td>
<td>184</td>
<td>55.5</td>
</tr>
<tr>
<td>Gym</td>
<td>M 225</td>
<td>24.8</td>
<td>140</td>
<td>35.4</td>
</tr>
<tr>
<td></td>
<td>F 117</td>
<td>21.6</td>
<td>99</td>
<td>39.9</td>
</tr>
<tr>
<td>Swimming</td>
<td>M 282</td>
<td>16.3</td>
<td>359</td>
<td>45.6</td>
</tr>
<tr>
<td></td>
<td>F 124</td>
<td>12.6</td>
<td>215</td>
<td>47.2</td>
</tr>
<tr>
<td>Cycling</td>
<td>M 174</td>
<td>18.1</td>
<td>225</td>
<td>52.6</td>
</tr>
<tr>
<td></td>
<td>F 153</td>
<td>17.6</td>
<td>197</td>
<td>50.9</td>
</tr>
<tr>
<td>Badminton</td>
<td>M 189</td>
<td>17.8</td>
<td>221</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>F 130</td>
<td>14.7</td>
<td>181</td>
<td>46.8</td>
</tr>
</tbody>
</table>

*Calcium:* Results of nutritional surveys on Chinese school students showed that calcium intake of middle and primary school averaged 200-600 mg/d which was only 30%–60% of the RDA (Zhang, An, Sun, & Li, 1997; Han, Kang, & Wang, 1999; Yang & Yang, 1997; Hong, Wang, Shen, & Cui et al., 1999; Shi & Li, 1999; Huang, 1999). A report on the assessment of urinary calcium of 638 students of middle and primary school showed that 57.7% of those investigated were in calcium deficient status (Xiang, 1998). Causes of the calcium deficiency are: insufficient milk and bean product intakes, lactose intolerance, lack of nutrition knowledge, improper dietary behavior, and there might be some components of dietary composition as phytate, oxalic acid and fibers which may affect calcium absorption.

Various efforts designed to establish healthy food habits, such as including milk or soy bean milk and soy bean products in the daily diet, adding some cereals into milk to reduce the intolerance of lactose, and the use foods of rich calcium source etc., have been tried and shown to be effective (Zhang, Sun, & Yu, et al., 1999; Zeng, 1998). Improved calcium and vitamin D nutrition of students not only benefits the prevention of rickets during childhood, but also helps to develop higher peak bone mineral density which is important for the prevention of osteoporosis during aging.

*Iron:* Nutrition surveys showed that the total intake of dietary iron has met or even exceeded the RDA requirements, but most of the dietary iron of students was from plant source, non-heme iron with low absorption rate. Iron deficiency anemia is the main type of anemia among Chinese students. The incidence of iron deficiency anemia fluctuated from 10% to 45% (Zhan, Sun, & Sun, 1996; Liu & Wang, 1999; Sun, Wang, & Sun et al., 1999) (Table 9).
### Nutritional Status, Problems and Strategies of Chinese Students

#### Table 9: The Incidence of Iron Deficiency Anemia of Chinese City and Rural Area Students (%)

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>City Boys</th>
<th>City Girls</th>
<th>Rural Areas Boys</th>
<th>Rural Areas Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>14.46</td>
<td>18.32</td>
<td>21.81</td>
<td>22.48</td>
</tr>
<tr>
<td>9</td>
<td>13.04</td>
<td>15.38</td>
<td>19.11</td>
<td>21.11</td>
</tr>
<tr>
<td>12</td>
<td>28.00</td>
<td>23.37</td>
<td>31.10</td>
<td>26.67</td>
</tr>
<tr>
<td>14</td>
<td>13.94</td>
<td>18.66</td>
<td>20.04</td>
<td>21.61</td>
</tr>
<tr>
<td>17</td>
<td>15.91</td>
<td>23.40</td>
<td>14.65</td>
<td>23.66</td>
</tr>
</tbody>
</table>


A study on the iron status of 113 very active girl students of an amateur school from the assessment of hemoglobin, ferritin, hematocryte (HCT), free erythrocyte porphrin (FeP) etc showed that the iron deficiency incidence was 55% (Table 10).

#### Table 10: Iron Status of very Active Students of Amateur Sports School in Beijing (N=56)

<table>
<thead>
<tr>
<th>Hb (g/dL)</th>
<th>Hct (%)</th>
<th>RBC (10^6/mm³)</th>
<th>FeP (ng/dL)</th>
<th>Ft (ng/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.9 ± 0.93</td>
<td>38.9 ± 2.65</td>
<td>405 ± 32</td>
<td>47.5 ± 2.8</td>
<td>30.2 ± 21.6</td>
</tr>
</tbody>
</table>

It has been found that the youths with great stature, i.e., the 8th category of Martin's standard, had higher anemia incidence, and this suggested that rapid growth may induce higher requirement for iron, and if the requirement cannot be met, then growth will be depressed (Ji, 1999). Comparing the incidence of anemia in 1995 with that of 1991, the results showed that the anemia incidence significantly decreased by 10% (National Education Committee, 1996). A study on the analysis of the trend of iron deficiency anemia prevalence of Chinese students indicated that most incidents of anemia were of a marginal and light degree and easily corrected (Table 11). However, the height, weight and physical fitness levels of anemic students were affected as compared with the data of normal students (Table 12-14). The National Education Committee (1996) indicated that iron deficiency anemia is one of the most important factors for growth and development, and iron deficiency anemia needs to be corrected urgently.

#### Table 11: Composition of Anemia Status of Chinese Students in 1995

<table>
<thead>
<tr>
<th>Students of</th>
<th>No. Investigated</th>
<th>Normal</th>
<th>Marginal</th>
<th>Light</th>
<th>Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Cities</td>
<td>M</td>
<td>21969</td>
<td>100</td>
<td>17174</td>
<td>78.2</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>21707</td>
<td>100</td>
<td>15818</td>
<td>72.9</td>
</tr>
<tr>
<td>Rural Area</td>
<td>M</td>
<td>21989</td>
<td>100</td>
<td>16996</td>
<td>77.3</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>21668</td>
<td>100</td>
<td>15898</td>
<td>73.4</td>
</tr>
</tbody>
</table>

Table 12: Comparison of Height between Anemic and Normal Students (cm)

<table>
<thead>
<tr>
<th>Years of Age</th>
<th>Normal</th>
<th>Anemia (Light)</th>
<th>Anemia (Moderate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>122.4 ± 5.8***</td>
<td>121.2 ± 5.7**</td>
<td>119.4 ± 5.0</td>
</tr>
<tr>
<td>9</td>
<td>131.6 ± 6.2***</td>
<td>130.8 ± 6.3***</td>
<td>127.9 ± 5.6</td>
</tr>
<tr>
<td>12</td>
<td>147.8 ± 8.3***</td>
<td>145.4 ± 7.9**</td>
<td>143.8 ± 8.0</td>
</tr>
<tr>
<td>14</td>
<td>161.5 ± 7.7***</td>
<td>158.0 ± 8.3</td>
<td>156.4 ± 10.5</td>
</tr>
<tr>
<td>17</td>
<td>168.8 ± 5.9</td>
<td>168.6 ± 6.6</td>
<td>170.1 ± 3.7</td>
</tr>
<tr>
<td>Female Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>120.8 ± 5.8</td>
<td>120.1 ± 5.6**</td>
<td>118.3 ± 5.6</td>
</tr>
<tr>
<td>9</td>
<td>131.3 ± 6.4</td>
<td>130.3 ± 6.6**</td>
<td>127.6 ± 6.4</td>
</tr>
<tr>
<td>12</td>
<td>149.2 ± 7.3</td>
<td>147.8 ± 7.6*</td>
<td>145.5 ± 8.7</td>
</tr>
<tr>
<td>14</td>
<td>155.5 ± 5.7</td>
<td>155.5 ± 5.5</td>
<td>154.5 ± 6.4</td>
</tr>
<tr>
<td>17</td>
<td>157.7 ± 5.4</td>
<td>157.5 ± 5.4**</td>
<td>160.1 ± 5.6</td>
</tr>
</tbody>
</table>

Data are X ± S.
Comparison between normal and light anemic group, and comparison between light anemic and moderate group. * P<0.05, **P<0.01, ***P<0.001

Table 13: Comparison of Weight between Anemic and Normal Students (Kg)

<table>
<thead>
<tr>
<th>Years of Age</th>
<th>Normal</th>
<th>Anemia (Light)</th>
<th>Anemia (Moderate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>22.3 ± 3.5***</td>
<td>21.7 ± 3.3**</td>
<td>20.8 ± 2.9</td>
</tr>
<tr>
<td>9</td>
<td>26.8 ± 4.7***</td>
<td>26.2 ± 4.3**</td>
<td>24.4 ± 3.0</td>
</tr>
<tr>
<td>12</td>
<td>36.7 ± 7.5***</td>
<td>35.1 ± 6.7*</td>
<td>33.6 ± 6.8</td>
</tr>
<tr>
<td>14</td>
<td>47.3 ± 8.1***</td>
<td>44.0 ± 7.6*</td>
<td>41.2 ± 7.4</td>
</tr>
<tr>
<td>17</td>
<td>55.9 ± 6.7*</td>
<td>55.6 ± 7.8*</td>
<td>53.8 ± 7.6</td>
</tr>
<tr>
<td>Female Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>21.2 ± 3.2**</td>
<td>20.9 ± 2.9*</td>
<td>20.2 ± 3.3</td>
</tr>
<tr>
<td>9</td>
<td>25.8 ± 4.2*</td>
<td>25.5 ± 4.3*</td>
<td>24.3 ± 3.0</td>
</tr>
<tr>
<td>12</td>
<td>37.5 ± 6.9**</td>
<td>36.5 ± 6.7*</td>
<td>34.7 ± 7.4</td>
</tr>
<tr>
<td>14</td>
<td>44.9 ± 6.5</td>
<td>44.6 ± 6.1</td>
<td>43.6 ± 6.1</td>
</tr>
<tr>
<td>17</td>
<td>49.4 ± 5.8</td>
<td>49.4 ± 5.9</td>
<td>50.6 ± 6.8</td>
</tr>
</tbody>
</table>

Data are X ± S.
Comparison between normal and light anemic group, and comparison between light anemic and moderate group. * P<0.05, **P<0.01, ***P<0.001
Table 14: Comparison of Speed of 50M Run between Anemic and Normal Students (second)

<table>
<thead>
<tr>
<th>Years of Age</th>
<th>Normal</th>
<th>Anemia (Light)</th>
<th>Anemia (Moderate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>10.91 ± 1.0**</td>
<td>11.03 ± 1.0</td>
<td>11.20 ± 1.0</td>
</tr>
<tr>
<td>9</td>
<td>9.85 ± 0.8***</td>
<td>9.96 ± 0.8</td>
<td>9.95 ± 0.8</td>
</tr>
<tr>
<td>12</td>
<td>8.89 ± 0.7***</td>
<td>9.03 ± 0.7</td>
<td>9.04 ± 0.8</td>
</tr>
<tr>
<td>14</td>
<td>8.18 ± 0.7***</td>
<td>8.41 ± 0.7</td>
<td>8.61 ± 0.8</td>
</tr>
<tr>
<td>17</td>
<td>7.58 ± 0.5</td>
<td>7.61 ± 0.5</td>
<td>7.58 ± 0.7</td>
</tr>
<tr>
<td>Female Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>11.46 ± 1.1**</td>
<td>11.55 ± 1.1</td>
<td>11.81 ± 1.19</td>
</tr>
<tr>
<td>9</td>
<td>10.30 ± 0.9**</td>
<td>10.38 ± 0.9</td>
<td>10.44 ± 0.94</td>
</tr>
<tr>
<td>12</td>
<td>9.40 ± 0.7**</td>
<td>9.48 ± 0.8</td>
<td>9.39 ± 0.76</td>
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<td>14</td>
<td>9.29 ± 0.8</td>
<td>9.31 ± 0.7</td>
<td>9.27 ± 0.72</td>
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<tr>
<td>17</td>
<td>9.21 ± 0.8</td>
<td>9.19 ± 0.8</td>
<td>9.35 ± 0.93</td>
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</table>

Data are X ± S.
Comparison between normal and light anemic group, and comparison between light anemic and moderate group,
* P<0.05, **P<0.01, ***P<0.001

- Vitamin A, B₁, B₂ insufficiency and deficiency, especially the marginal deficiencies, are common in Chinese students according to the nutritional investigations. Improvements have been shown through dietary interventions as well.

Strategies to improve the nutritional status of Chinese students are suggested as follows:

1. Nutrition education and nutrition knowledge popularization should be carried out for students. In addition, it is important for their parents, teachers, managers of food companies, and cooks as well.
2. Promote daily physical activity/exercise and improve the arrangement of exercise lessons in schools.
3. Promote and extend nutritional lunch at school, but scientific management should be stressed and implemented.
4. Encourage the intake of milk and soybean products to increase calcium and protein nutrition, and to promote the soybean action plan of the country.
5. Conduct nutrition training courses related to students’ health and nutrition; carry out tests on “assorting foods for meals scientifically” at selected points.
6. Intervention measures, including physical activity and nutritional improvement for chronic diseases as obesity, cardiovascular disease, diabetes, and osteoporosis must be stressed and carried out during childhood.
7. Increased attention should be given to the nutrition of students during the fast growing and development period because of their increased nutrient requirements.

Improvement of nutritional status, physical fitness, and health of Chinese students needs the attention and behavior of the government. Dietitians working for students at schools should be considered and arranged.
SUMMARY

Nutritional status of Chinese students has significantly improved according to the results of various studies and surveys. However, Chinese students are still facing both the problems of malnutrition and nutritional excess. Dynamic changes of the nutritional status of Chinese students showed that an increase of the incidence of over-weight and obesity is the main trend in the recent years. Nutritional education and intervention for students, and their parents, and teachers should be an important and urgent strategy. The main nutritional problems were on energy, protein, calcium, iron, and some vitamins. Strategies to improve the nutritional status of Chinese students are suggested.

REFERENCES

Hong, Y., Chan, K., & Wang, Y. (1997). Comparison of cardiopulmonary endurance and muscular fitness in teenagers between Hong Kong and inland cities. Chinese Journal Preventive Medicine, 31(10), 19-23.

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Nutritional Status, Problems and Strategies of Chinese Students


A Universal Approach in Action:
Philosophy and Physical Education

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Abstract
This article is designed to investigate the link between philosophy and physical education; the link between Eastern and Western viewpoints; and the link between the present and future vision and mission in physical education. The universe is a unit of networks, in which all are interconnected. People are often enlightened by the discovery of connections. Lao-tsu (604-531 BC) "All opposites are inseparable, complementary and mutually supplant each other. Socrates (469-399 BC) "I am not an Athenian nor a Greek, but a citizen of the world." At the beginning of the new millennium, the concept of international community and instant communication has become more obvious than ever before in our lives. We are the citizens of the world in which all are interconnected and interdependent. In the future, there must be shared-vision, shared-mission, and shared-responsibility. In a broad sense, the East and West must cooperate and learn from each other and to enjoy the rich heritages of wisdom together.

Physical education is an integral part of total education therefore it is essential to take a holistic approach in our education. Philosophy is the wisdom of life, it teaches us how to think, recognize, conduct, organize, and approach the unknown. It searches for truth, cultivate the wisdom, and prove its value. da Vinci (1452-1519) "Philosophy shows the meaning and the direction of life through its wisdom. Goethe (1749-1832) "Wisdom is only found in truth." Philosophy assists to see the problem clearer; to understand the matter deeper; to extend our view further and wider in our life. The Greek poet Archilochus (650 BC) "The fox knows many things but the hedgehog knows one big thing." Nineteenth century mathematician, Jules Henri Poincare' (1854-1912) discovered that an interaction between two opposite things produces a unique outcome. Therefore, it is important that physical education integrates with philosophy and becomes the most effective means of education.

INTRODUCTION
The purpose of this paper is to investigate the link between philosophy and physical education; Eastern and Western philosophy; and the present and future vision and mission in physical education.

The universe is a unit of live networks, in which all are interconnected. People are often enlightened by the discovery of connections. Lao-tsu (604-531 BC) "All opposites are inseparable, complementary and mutually supplant each other. Socrates (469-399 BC) "I am not an Athenian nor a Greek, but a citizen of the world." Greek poet Archilochus (650
BC) "The fox knows many things but the hedgehog knows one big thing." Therefore, it is not how many things we know, but what we know which will direct and monitor our lives effectively that will count most (Chen, 2000).

At the beginning of the new millennium, the concept of international community and instant communication has become more obvious and important than ever before in our lives. We are the citizens of the world in which all are interrelated and interdependent.

In the future, there must be shared-vision, shared-mission, and shared-responsibility. In a broad sense, the East and West must cooperate, learn from each other and enjoy the rich heritages of wisdom and knowledge together.

PHILOSOPHY AND PHYSICAL EDUCATION

What is Philosophy?

Philosophy is concerned with the fundamental problems—including the nature of mind and matter, perception, self, free well, causation, time and space, and the existence of moral judgements (Upshall, 1995).

Philosophy is concerned with the basic problems of mind, matter, and perception. It investigates the fundamental issues that govern life and the universe; it searches the structure and principles of all reality. It is in the pursuit of truth that we cultivate the wisdom, and prove its value.

The aims of philosophy are to encourage people to think and reflect critically, logically, clearly, and competently. Philosophy is the critical study of the basic principles of those issues as the meaning of life, order, knowledge, wisdom, and truth. It teaches us how to think, recognize, conduct, organize, and discover (Chen, 2000).

Einstein (1879-1970) Nobel Prize for physics 1921 "Philosophy is the mother of science." Max Born (1882-1970) Nobel Prize for physics 1954 "I am now convinced that theoretical physics is actual philosophy" In philosophy, the concepts with which we approach the world become the topic through our inquiry. Philosophy is a love of wisdom and truth.

Famous philosophers and their relevant quotations:
Lao-tsu (604-531 BC) Chinese philosopher
"Acting without design, occupying oneself without making a business of it, finding the great in what is small and many in a few, repaying injury with kindness, effecting difficult things while they are easy, and managing great things in their beginnings: This is the method of Tao.
Confucius (551-479 BC) Chinese philosopher
"Everything has its beauty but not everyone sees it."
Socrates (469-399 BC) Athenian philosopher
"What most count is not to live, but to live right."
Plato (429-347) Greek philosopher
"Everywhere there is one principle of justice, which is the interest of the stronger."
Aristotle (384-322 BC) Greek philosopher
"It would be wrong to put friendship before truth."
A Universal Approach in Action: Philosophy and Physical Education

Francis Bacon (1561-1626) English philosopher and lawyer
"Histories make men wise; poets, witty; the mathematics, subtle; natural philosophy, deep; moral, grave; logic and rhetoric, able to contend."

Descartes (1596-1650) French philosopher and mathematician
"The reading of all good books is like conversation with the finest man of the past centuries." "I think, therefore I am."

John Locke (1632-1704) English philosopher, "Whenever law ends, tyranny begins." In his two treaties that "all men are equal and independent and possess the natural right to life, health, liberty and possessions." These are found in the American Declaration of Independence and the Constitution.

Voltaire (1694-1778) French philosopher and writer
"I do not agree with a word that you say, but I will defend to the death your right to say it."

Immanuel Kant (1724-1804) German philosopher
"The civil constitution of every state shall be republican, and war shall not be declared except by a plebiscite of all citizens."

Georg Hegel (1770-1831) German philosopher
"Reason is the substance of the universe...the design of the world is absolutely rational."

Herbert Spencer (1820-1903) English philosopher
"Science is organized knowledge."

William James (1842-1910) American philosopher and psychologist
"The whole function of philosophy ought to be to find out what definite it will make to you and me..."

John Dewey (1859-1952) American philosopher and educational theorist
"Thinking and doing are closely related. Knowledge is tied to a practical solution. We know through problem solution, he called instrumentalism."

Alfred North Whitehead (1861-1947) British philosopher and mathematician
"The history of Western philosophy is, after all, no more than a series of footnotes of Plato’s philosophy."

Bertrand Russell (1872-1970) British philosopher and mathematician
"Mathematics, rightly viewed, possesses not only truth, but suprême beauty...a beauty cold and austere, like that of sculpture."

Jean-Paul Sartre (1905-1980) French philosopher, dramatist and novelist
"Man is nothing else but what he makes of himself."

It is clear that through these quotations, we learn about the essence of philosophy from well-known philosophers (Chen, 2000).

What is wisdom and truth?

Wisdom is the ability to think and act, using knowledge, experience, understanding, common sense, and insight. It is a wise saying or teaching. Therefore, an ordinary person applies only one's own wisdom and a wise person uses wisdom of others, but the rest of them never use of any (Chen, 2000).

The main mission of philosophy is the pursuit of truth and wisdom. Wisdom is to anticipate the future and create the future. The following are some selected quotations relevant to wisdom and truth:

Goethe “wisdom is only found in truth.”
Socrates “The beginning of wisdom is a definition of terms.”
Greek wisdom, “Wonder is the beginning of wisdom.”
Lao-tsu "Wisdom is seeing the true nature of others. Enlightenment is seeing the true nature of Tao."
Peter Abelard (1079-1142) French philosopher and scholar "The first key to wisdom is this-constant and frequent questioning--for by doubting we are led to question and by questioning we arrive at the truth."
Bertrand Russell "With every increase of knowledge and skill, wisdom becomes more necessary, ---the world will need wisdom in the future even more than it does now."
da Vinci (1452-1519) Italian painter, sculptor, and engineer "The philosophy is the noblest pleasure, the joy of understanding. It shows the meaning and the direction of life through its wisdom."

William Shakespeare (1564-1616) The greatest English writer "Brevity is the soul of wit."
William Cowper (1666-1709) English surgeon and anatomist "Knowledge is proud that he has learned so much; Wisdom is humble that he does not know more."
Benjamin Franklin (1706-1790) American statesman and scientist "Without Freedom of Thought, there can be no such thing as Wisdom."
Alfred Lord Tennyson (1809-1892) British poet "Knowledge comes, but wisdom lingers."
Matthew Arnold (1822-1888) English poet and critic "Truth sits upon the lips of dying men."
Benjamin Disraeli (1804-1881) English statesman and writer "Justice is truth in action."
Mark Twain (1835-1910) American writer "Truth is the most valuable thing we have. Let us economize it."
William James (1842-1910) American philosopher and psychologist "The art of being wise is the art of knowing what to overlook."
Elbert Hubbard (1856-1915) "Every man is a damn fool for at least five minutes every day; Wisdom consists in not exceeding the limit."
T.S. Eliot (1888-1965) US born British poet and dramatist "Where is the wisdom we have lost in knowledge."
Walt Whitman (1819-1892) US poet "Wisdom is not finally tested in schools, wisdom cannot be passed from one having it to another not having it, wisdom is of the soul, is not susceptible of proof, is its own proof."
Abba Eban (1915) Israeli politician "History teaches us that men and nations behave wisely when once they have exhausted all other alternatives."

Wisdom is considered to be useful, practical, educational, relevant and wise references to apply in pursuits of excellence in any of professional and family life, especially in the teaching profession. The essence of wisdom is considered to be very effective principles to get to the truth of matter in a quickest way possible and to achieve the best results in a shortest time possible (Chen, 2000).

The writer has discovered some very unique common features and characteristics among these great people. In reality, they are the people who believed and lived through their lives with strong convictions in searching for wisdom and universal constant.
They have their unique ways to perceive the universe; they have a simple but a subtle and holistic way to sum up the universe as a whole.

For example:
- Aristotle’s *EQ*
- Beethoven’s *mission of life*
- Buddha’s *eight fold path*
- Confucius’s *Confucianism*
- Descartes’ *I think, therefore I am*
- Einstein’s *E=MC²*
- Hegel’s *theory of dialectic*
- Lao-tzu’s *Taoism*
- Newton’s *F=MA*
- Socrates’ *knowing yourself*
  (Chen, 1997)

They were the people with in-depth empathy of both people and nature. They could see, think, do, and hear beyond many others, which made them different. In reality, they were all equipped with a spectrum of wisdom, which crossed the disciplines and linked with the universe as a unit of dynamic network. Wisdom and truth are the two most valuable things that we have in our lives which will bring us fairness, justice, dignity and energy, so we must make every effort to nurture them, value them, and use them.

**Application of Philosophy**

Philosophy is the torch of our life, which assists us to see the problem clearer; to understand the matter deeper; to extend our view further and to change our attitude and life. It is the way to help us how to organize, manage, conduct, and lead. Philosophy is an anchor of our life. It inspires our thinking; it stores our wisdom; it enriches our lives; it creates our new future and New Hope.

The following 16 selected quotations, which have been used, and applied across the disciplines, continents throughout the history, which can be applied for effective learning and teaching as follows:

- "The man who gets angry at the right things and with the right people, and in the right way and at the right time and for the right length of time is commended." Aristotle (384-322 BC)
- "If a man will begin with certainties, he shall end in doubts, but if he will be content to begin with doubts, he shall end in certainties." Frances Bacon (1561-1626)
- "The reading of all good books is like a conversation with all the finest men of past century." Descartes (1596-1650)
- "The never-ending task of self-improvement." Ralph Waldo Emerson (1803-1882)
- "I have always felt that the true textbook for the pupil is his teacher." Gandhi (1869-1948)
- "We must always change, renew, rejuvenate ourselves; otherwise we harden." Goethe (1749-1832)
- "Reason is the substance of the universe: the design of the world is absolutely rational." Georg Hegel (1770-1831)
- "Human beings, by changing their attitudes of their minds, can change the outer aspects of their lives." William James (1842-1910)
"Theory needs to be proved by a sound practice and practice needs to be proved by a sound knowledge of theory." Immanuel Kant (1724-1804)

"Teaching without words and work without doing are understood by few." Lao-tsu (604-531 BC)

"You can not help men permanently by doing for them what they could and should do for them-selves." Abraham Lincoln (1809-1865)

"He, who does anything because it is the custom, makes no choice." John Stuart Mill (1806-1873)

"Beauty of style and harmony and grace and good rhythm depends on simplicity." Plato (4227-347BC)

"Character is simply habit long continued." Plutarch (46-120)

"The survival of the fittest." Herbert Spencer (1820-1903)

"I not only use all the brains I have, but all I can borrow." Woodrow Wilson (1856-1925)

There is nothing either good or bad, but thinking makes it so. Shakespeare

The rich source of wisdom from the past and the future is equivalent to the nature source of sun, air, water, and earth to our lives; they are essential parts of our lives. It is up to us to learn how to use them (Chen, 2000).

*Philosophy*

*Philosophy is life.*

*Philosophy is truth.*

*Philosophy is wisdom.*

*Philosophy is universal constant.*

(Chen, 1999)

**What is Physical Education?**

Physical education is an integral part of total education in which the concept of total well being is the central core to the subject of physical education. Total well being involves physical, mental and emotional, social and spiritual well being. Therefore, it is essential that a holistic approach in physical education be taken. Effective implementation of physical education will encourage students to learn and develop confidence in themselves and their abilities. It also helps them to take responsibility for their own health and well being.

The general aims of physical education are:

1. develop the knowledge, skills, and habits required to enhance personal health-related fitness and physical development.
2. develop motor skills, concepts and positive attitude towards physical activity for now and future.
3. develop interpersonal skills and attitudes enhancing interaction and relationships with others.
4. develop and create healthy communities and environments through shared responsibility and interdependence.

ICPE 2000 Proceedings
According to the World Health Organization the concept of total well being includes physical, mental/emotional, social, and spiritual aspects of well being.

1. Physical well being is the aspect of physical growth and develops the ability to move and care for the body.
2. Mental and emotional well being is to develop thinking processes, expressing thoughts, feelings, and responding positively.
3. Social well being is to develop interpersonal relationship, feelings of belonging and social support.
4. Spiritual well being is to search the values, meaning, and purpose of life, personal identity, and self-awareness (Ministry of Education, 1999).

These four aspects of well being are interrelated and interdependent. They influence and support each other and together form a holistic approach for total well being. It is physical education; it is education and it is philosophy as well.

What is education?

Gilbert Keith. Chesterton (1874-1936) British novelist, essayist, and poet "Every education teaches a philosophy: if not by dogma then by suggestion, by implication, by atmosphere. Every part of that education has a connection with every other part. If it does not all combine to convey some general view of life, it is not an education at all." (Maggio, 1997)

Zora Neale Hurston (1901-1960) American novelist says, "Learning without wisdom is a load of books on a donkey's back." (Maggio, 1997)

From the above quotations and statements that it is clear that education, physical education, and philosophy are closely related and they have much in common and connection. From an interdisciplinary viewpoint, philosophy is the building block, common thread, and foundation for education and physical education.

East meets West

D. T. Suzuki (1870-1966) well known for his Essays in Zen Buddhism, in his Buddhist philosophy (1951) he made an important distinction between two terms: reason and wisdom (Thomson, 1999).

Consciousness is translated as reason and in the Western philosophy analytical is the primarily concerned. Wisdom is translated as an application of useful knowledge in all aspects of life as a whole.

From the Western viewpoint, Eastern wisdom is bonded with religion, morals, and culture. From Eastern viewpoint, Western consciousness is mainly concerned with rationality. In fact, Eastern wisdom is not simply logic and speculation, it is also concerned with experience and intuition. Wisdom applies in all aspects of life. Eastern philosophy has many parallels to Western philosophy. The only major difference is that Eastern philosophy is not isolated from other disciplines. The task of Western philosophy is the application of rational thought with more attention on validity and clarity. It is the systematic search of knowledge.
Eastern wisdom integrates philosophy, psychology, sociology, and religion. Therefore, the Eastern philosophy involves a wide range of issues in life. It seeks harmony and balance with the universe as well as people.

**Nobel Prizes shared between East and West**


1973—Leo Esaki, Japanese physicist from Osaka shared Nobel Prize in physics with Ivar Giaever, Norwegian-born American physicist and Brian David Josephson, Welsh physicist for work on tunneling effects.

1976—Nobel Prize for physics were shared between Burton Richter American particle physicist and Samuel Ting, physicist raised in China educated there, Taiwan and Michigan University who had discovered the J/psi almost simultaneously.

1981---oald Hoffmann Polish born American Chemist with R. B Woodward, he developed the Woodward-Hoffmann rules, which enable the path of an important class of organic reaction to be predicted. Hoffmann shared 1981 Nobel Prize in chemist with Kenichi Fukui, Japanese chemist, born in Nara, professor of physical chemistry at Kyoto Imperial University in 1951 who had worked independently in related areas.

1986--Dudley Herschbach, USA, Yuan T. Lee, Taiwan, and John Polannyi, Canada shared Nobel Prize in chemistry for the dynamic of chemical elementary processes.


**THE LINK BETWEEN EASTERN AND WESTERN CONCEPTS**

**The concept of spontaneity**

"Be empty—Be still. Watch everything just come and go." Lao-tsu

"Emerge from the source and return to the source. This is the way of nature." Emerson (1803-1882)

This corresponds with Jean Jacques Rousseau (1712-1778) says, "I venture to declare that a state of reflection is contrary to nature; and that a thinking man is a depraved animal."

A Universal Approach in Action: Philosophy and Physical Education

The concept of inspiration

"Teaching without words are understood by few." Lao-tsu (604-531)
"Talking is not teaching, listening is not learning, action follows conviction." Confucius (551-479 BC)

Plato (429-347 BC) offers his advice to educators that their main business was not put into the mind knowledge which was not there before, but to turn the mind's eye towards light so that it might see for itself.

The concept of seven brains

From the Chinese history there was Shen Gua (1031-1095), a millennium polymath who not only researched military technology, astronomy, calendars, geology, meteorology, and mathematics, but also made milestone contributions to art and literature.

Shen Gua talent was considered being equivalent to de Vinci (1452-1519), the famous Italian painter, sculptor, architect, engineer, inventor, scientist, and musician.

The concept of change

There are links between Eastern and Western ideas, for example Greek philosopher Heraclitus (535-475 BC) "Everything flows and nothing stays." "You can't step into the same river twice."
Lao-tsu's (Sixth century BC) "Everything is changing and impermanent. The only permanent feature of life is change."
Buddha (563-483 BC) "This being so, that arises. This no longer being so, that ceases."
Therefore everything exists is the temporary condition.
"The universe is transformation; our life is what our thoughts make it."
Marcus Aurelius Antoninus (121-180 AD) Roman Emperor
"There is nothing in this world constant, but inconstancy."
Jonathan Swift (1667-1745)
"Change is of two different kinds: alternation and transformation."
L Ching (Book of Changes)

The concept of Wu-Wei (effortless activity)

Aristotle and Aquinas "Unmoved mover and uncaused cause." (Thomson, 1999) This is parallel to Lao-tsu's unmoved and uncaused basis of everything. Taoist philosophy is stillness, which is prior to action. Although Tao is motionless, it provides the basis of everything. Tao is to be in harmony with the universe and in harmony with people.

"The wise can act by just being, and teach without speaking.
Things come to them, because they let them go.
They create by not trying to possess.
They succeed by not seeking reward.
What needs to be done is done and then forgotten."
They are always moving on.
Lao-tsu
(Freke, 1995)

The concept of utilitarian

The approach to ethics applied by Mo-tsu (473-380 BC) has similar parallels with the Christian principles of self-giving love, which is the basis on which one should love others as one loves oneself (Thomson, 1999). Mo-tsu "To love everyone results in the greatest benefit to oneself and to others." He was a utilitarian as was Jeremy Bentham (1748-1832) and John Stuart Mill's (1806-1873).

The concept of destiny

Han Yongun (1879-1944) Korea says, "What determines one's fate is not Heaven, but oneself." (McGreal, 1995) This statement is similar to what Shakespeare (1564-1616)" There is nothing either good or bad but thinking makes it so." And what John Milton (1608-1674) says, "The mind is its own place, and in itself can make a heaven of hell, a hell of heaven." (Chen, 2000)

Buddha (563-483 BC) "Do not believe what you have heard, Do not believe in anything that has been spoken of many times. Do not believe in conjecture. But after careful observation and analysis, when it agrees with reason and it will benefit one and all, then accept it and live by it." He was living in search of a higher truth (Dyer, 1998). His approach was like that of Socrates, look at a commonly believe, examine its implications, as what Socrates says, "Unexamined life is not worth living."

The concept of the mean (Middle way)

The doctrine of mean is one of the Confucian canons called "the Four Books." Chung Yung means the central harmony, the golden mean, or the mean-in-action. The doctrine of the mean explains: The superior person knows how to attain equilibrium and harmony to the highest degree. Similar to mean (Chong Yung), Buddha's the 'middle way' refers to the middle ways between the extremes (Mcgreal, 1955).

This idea is parallel to that of Aristotle (384-322 BC), "Anyone can become angry---that is easy. But to be angry with the right person, to the right degree, at the right time, for the right purpose, and in the right way----this is not easy." (Coleman, 1995) Yin and Yang is central to Taoism: a sense of balance, a natural balance and order of nature.

This is parallel to Herbert Spencer (1820-1903) British philosopher in his social static "that those will survive whose function happen to be most early equilibrium with the modified aggregate of external forces." And Abu Bakr Al-Razi (865-925) Iraq "In the pursuit of pleasure, a kind of mean---an upper and lower limit---should be observed."
The concept of dichotomy

Therefore having and not having arise together.
Difficult and easy complement each other;
Long and short contrast each other;
High and low rest upon each other;
Voice and sound harmonize each other;
Front and back follow one another.
Lao-tsu
(Feng and English, 1986)

Nineteenth century mathematician Jules Henri Poincare (1854-1912) discovered that "an interaction between two opposite things produces a unique outcome." (Chen, 1999)

It is therefore important that physical education links and integrates with philosophy as its foundation. This is parallel to Hegel's dialectic where thesis and antithesis are resolved in a synthesis (McLean, 1987).

The concept of interconnectedness

Lao-tsu (604-531 BC) "All opposites are inseparable, complementary and mutually supplant each other." Buddhist philosophy indicates that "we are not separate from the rest of the world, we are all part of the world, and are totally depending on the rest for it."

Ludwig Wittgenstein (1889-1951) Austrian philosopher says, "The world and life are one." "The totality of thought is a picture of the world." Marshall McLuhan (1911-1980) Canadian academic says, "The new electronic interdependence recreates the world in the image of a global village." Gilbert Ryle (1900-1076) English philosopher says, "The concept of mind that mind arises as a result of other phenomena and is not independent on them."

PRESENT AND FUTURE

In the 21st century more than 80% will be self-motivated, self-supported, self-learning and self-managed professionals and only a small minority will be unskilled laborer forces.

William W. Winpisinger, in his book of reclaiming our future, quoting a survey by the International Metalworkers Federation indicated that within 30 years as little as 2% of the worlds current labor force would be needed to produce all the goods necessary for the total demand of the world (Winpisinger, 1989).

Nicholas Negroponte, in his book of Being Digital, mentioned that by the year 2020 the largest employer in the developed world would be "self" (Negroponte, 1995).

Jeannette Vos recommended assessment system for the 21st century as follows:

50 % self assessment
30 % peer assessment
20 % teacher or boss assessment

(Dryden and Vos, 1997)
In the era of instant communication everyone is a computer operator, there will be a computer on everyone’s desk, which will be your textbook and education. Teachers will require the ability to teach information gathering skills, problem-solving skills, computer literacy, and educational technology.

In the future, those nations that fully realize, utilize, and link with electronics, Internet, World Wide Web, new learning techniques, and self directing learning with continuing education will lead the world.

**SUMMARY AND CONCLUSION**

"*Without contrary is no progression. Attraction and repulsion, reason and energy, love and hate are necessary to human existence.*"
William Blake (1757-1827) English poet

"*No government is long secure without a formidable opposition.*"
Benjamin Disraelie (1804-1881) British statesman and novelist

"*Even differences prove helpful, where there are tolerance, charity and truth.*"
Gandhi

"*If we cannot end our differences, at least we can help make the world safe for diversity.*"
John F. Kennedy

"*If everyone is thinking alike then somebody isn’t thinking.*"
General George Patton

"*Study the past, if you would divine the future.*"
Confucius

"*All for one, one for all, that is the device, is it not?*
Alexandre Dumas (1824-95) French writer

"*The totality of the thought is a picture of the world. The limits of my language mean the limits of my world.*"
Ludwig Wittgenstein (1889-1951) German philosopher

"*The main intellectual accomplishment of the nervous system is the world itself.*"
George Miller British psychologist

**Life**

"*Life is not brief candle to me. It’s a sort of splendid torch which I’ve got to hold up for the moment and I want to make it burn as brightly as possible before handing it on to future generation.*"
George Bernard Shaw (1856-1950)
Future

The cooperation between people and technology is the key.
The mind, technology, and international language lead the world.
The development of anything is much faster than our imagination.

Prediction

Invisible is visible.
Impossible is possible.
Unpredictable is predictable.
(Chen, 1999)

Relationship

Interaction creates the stimulation.
Interconnection facilitates the creation.
Interdependence enriches the progression.

The Universe

The East plus West equals everything.
The size of our mind is the size of our world.
The progress of the world depends on our struggle and effort.

Holistic Approach

There are more common than differences among us.
We need to welcome both common and differences.

Common things help us to recognize each other.
Differences challenge us to learn from each other.

Interdependence

Share what we have.
Enjoy what ahead of us.
Make the most of our lives.
Leave the mark and legacy.
A universal approach in action

An interdisciplinary approach is the key to our education.
A universal approach is the key to our success and progress.

Physical education is an integral part of total education.

Let's put our vision, mission, decision, and action together.
Let's make our subject the most effective means of education.

REFERENCES

Comprehensive School Health Model: An Integrated School Health Education and Physical Education Program

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Abstract
The importance of school health education in promoting the health of young people and contributing to the overall public health has been recognized worldwide. With the development of China’s public and school health education, the demand for professionals involved in the design, implementation, and evaluation of effective school health programs is inevitably increasing.

This presentation intends to introduce contemporary school health programs in the United States, in general, and discuss a conceptual framework developed for China’s school health program, in particular. Currently, two models are widely adopted in the United States in guiding its school health programs -- the Comprehensive School Health Program (CSHP) and the School Health Coordinator (SHC). Special attention will be directed for delivering these program elements in a coordinated and interactive manner and how to integrate physical education and health education in a comprehensive health program for schools. The constructs in current China’s school health programs will be identified. A conceptual framework that may be of assistance in China will be defined by combining the theories of behavioral science and the practices of China’s education system and school health programs. Health education and physical education, as well as how these two elements could be best integrated to motivate the efforts of schools, families, and communities in health promotion, will be emphasized in the conceptual framework. Further study is needed to provide empirical evidence for effectiveness and acceptability of our proposed model for the Chinese culture. The information provided might be helpful in the current development of physical education embedded in public health, in general, and school health in specific.

INTRODUCTION

Ever since human beings have lived, health has been a great concern of nearly every individual, community, society, and country. The battle to achieve optimal health for everyone has never ceased. During the last century, dramatic strides have been made in the health field. In the United States alone, health status has been greatly improved in the following aspects: prolonged life expectancy, declining mortality rate, declining infant mortality, and advanced modern biomedicine (Barsky, 1988). Nevertheless, the United
States is still facing great challenges in the battle of health for everyone. On one side, the overall health status of the population is improving, while on the other, the nation each year is spending more money than ever on its health care. Medical care is playing an increasing role in daily lives, and yet certain diseases still find ways to spread.

Health education is a profession that stands in the forefront of this centuries old battlefield. Its role has never been so heightened as today. The goal of health education is to provide the individual with the information, skill, and motivation necessary to make intelligent decisions concerning lifestyle and personal health behavior. In any case, health education is working to promote health, prevent disease, disability, and premature death. Within its limited space, this paper intends to analyze the trends, challenges, and opportunities health education faces, to discuss behavioral factors that influence one's health, to introduce the concept of school health education programs, and to suggest a comprehensive school health model that might work in China.

**Trends, Challenges and Opportunities**

Many of the health challenges facing young people today are different from those plaguing the public’s health a century ago. In the early 1900s, the major causes of morbidity and mortality were infectious diseases. Many major health threats were diseases associated with poor hygiene, poor sanitation, poor nutrition, or poor maternal and infant health (Centers for Disease Control [CDC], 1999a; CDC, 1999b; CDC, 1999c). However, advances in medications and vaccines have largely addressed the ravages once wrought on children by infectious diseases. Modern biomedicine has enhanced our ability to predict, detect, diagnose, and treat the array of diseases to which human beings are heir (Barsky, 1988). During the 20th century, the health and life expectancy of persons residing in the United States improved dramatically. Deaths from infectious diseases have declined markedly in the United States (Figure 1). This decline contributed to a sharp drop in infant and child mortality. In 1990, 30.4% of all deaths occurred among children aged less than 5 years, while in 1997, this percentage was only 1.4%. The decline was also due to more than 30 years increase in average lifespan of persons in the United States, of which 25 years of this gain are attributable to advances in public health (Bunker, Frazier, & Mosteller, 1994). Today, the major health problems are caused, in large part, by behaviors established during youth (Kolbe, 1993). The 10 leading causes of death in 1900 and 1997 (Figure 2) revealed that in 1900, the three leading causes of death were pneumonia, tuberculosis (TB), and diarrhea and enteritis. In 1997, heart disease and cancer accounted for 54.7% of all deaths and most of the leading causes of death are health-compromising behaviors (CDC, 1999a).
In comparing Table 1 and Figure 2, the two most rapid growth behavioral causes of death are sexual behavior and drug use (Table 1) (McGinnis & Foege, 1993). Transmission of AIDS, which joined the list of top ten causes of death, is attributed mostly to sexual behavior and drug use. Given that behaviors are often the actual causes of death, a reduction in the number of deaths caused by many diseases lies not in finding cures for them but in changing the behaviors that lead to them in the first place. The truth is that the health of young people, and the adults they will become, is critically linked to the health-related behaviors they choose to adopt.

**Table 1: Nine Leading Behavioral Causes of Death**

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<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tobacco</td>
</tr>
<tr>
<td>2</td>
<td>Diet and activity patterns</td>
</tr>
<tr>
<td>3</td>
<td>Alcohol</td>
</tr>
<tr>
<td>4</td>
<td>Microbial agents</td>
</tr>
<tr>
<td>5</td>
<td>Toxic agents</td>
</tr>
<tr>
<td>6</td>
<td>Sexual behavior</td>
</tr>
<tr>
<td>7</td>
<td>Firearms</td>
</tr>
<tr>
<td>8</td>
<td>Motor vehicles</td>
</tr>
<tr>
<td>9</td>
<td>Drug use</td>
</tr>
</tbody>
</table>

In the United States, a saying states, “An ounce of prevention is worth a pound of cure,” which indicates prevention is more important than treatment in general. In many countries and cultures it is common sense to believe that taking measures to prevent illness can help more people than the treatment of preventable illness. A lot of people often neglect to maintain their health when they are young. Consequently, many preventable health problems are not prevented. This is especially true with most chronic diseases that have been traced as a result of various unhealthy behaviors. One example of this is the relationship between smoking and lung cancer.

Prevention is also a cost effective strategy in health promotion and disease prevention. Researchers in the field have provided sufficient evidence to prove that prevention is most cost effective in maintaining people’s health, reducing morbidity and mortality rates, saving medical cost, yielding a higher level of productivity, and securing a happier life for the people in a community or society. Existing data have shown that as many as 50% to 80% of deaths caused by cardiovascular disease, strokes, and cancer could be avoided or delayed by preventive measures. Eliminating smoking could prevent more than 300,000 deaths each year while changes in diet could prevent 35% of unnecessary deaths from heart disease (Hales, 1999). No amount of money could possibly compensate for those lives, nor buy people’s health.

Health knowledge is the accumulation of factual information that influences decision making regarding one’s health. High-quality health knowledge could lead to high-quality health decision-making. Low-quality health knowledge, alternatively, may create the potential for health-compromising decisions. When a person becomes more knowledgeable about his/her own health and about the health of others, and more competent in the application of that health knowledge, he/she will realize that a positive healthy life style offers the best prospect for a healthy, long, happy, and productive life.
Comprehensive School Health Model: An Integrated School Health Education and Physical Education Program

However, having knowledge about prevention does not guarantee that a person will establish a positive attitude toward disease prevention, or practice a healthy behavior as most positive health behaviors are a matter of voluntary action. People choose them, and they cannot be forced to accept. Altering one’s attitude and behavior often requires special efforts involving education, manpower, sound strategies, and ultimately, time. Education that aims at one’s behavior change cannot be a onetime snapshot. One school class session, one community health education program, or once a year mass activity may only yield a brief, or limited effect.

Schools have the potential to improve the health of young people by providing instruction, programs, and services that promote a healthy lifestyle for students. Schools are an efficient vehicle for providing health instruction and programs because they reach most children and adolescents. In the United States, every single school day, about 52 million students attend more than 100,000 schools, and roughly 14 million attend colleges and/or universities (Hales, 1999). In the lexicon of public health and medicine, this means that schools could prevent many health problems from occurring; detect health problems that do occur during the early stages when they are most treatable; and treat those problems that have not been or cannot be prevented, to preclude adverse effects on health and education (Kolbe, 1993). In short, schools can make an enormous, positive impact on the health of young people.

The good news for school health education is that health education is now recognized as being important because it is one of few curriculum areas that emphasize the individual instead of the subject matter or academic skills. The health information and skills students learn are not prerequisites for another course, but are immediately applicable to life (Lohrman, Gold, & Jubb, 1987). Armed with advanced technology, information super-highway, health education in today’s schools has many advantages it never had before. Distance learning, internet courses, interactive educational web pages, and the dramatic increase of computer availability and on-line time add fresh life to school education, which makes schooling more attractive and effective, learning more delightful and efficient, and information more broad and accessible. The technology also enables health education to reach a wider population. School health education is no longer just a classroom lecture or physical education. Comprehensive school health education programs have been well recognized and delivered to a majority of campuses nationwide. These programs tend to be more informative, student centered, demonstrative in scope, sequence, progression and continuity. Many are designed to develop students’ critical thinking and individual responsibility for one’s health, structured to incorporate current and emerging health problems, focused on the dynamic relationship among physical, mental, emotional, social, spiritual, and environmental well-being, and strengthened by integrating available community resources into classroom teaching (Collins et al., 1995). Although school health education curriculums vary from school to school, more community and family involvement has been included and supported. Cooperation and collaboration among health educators at local, state, national, and international levels have also fostered the effectiveness of current school health programs.

Behavior Factors and Behavior Relations

Many external factors can and often affect people’s lives --- from the weather, which can temporarily dampen or brighten people’s mood, to genetic predispositions that can result in certain health conditions. Behaviors that affect people’s health include exercising regularly,
eating a balanced, nutritious diet, seeking care for symptoms, and taking necessary steps to overcome illness, and restore well being.

Factors that shape positive behaviors include predisposing, enabling, and reinforcing factors (Hales, 1999). Predisposing factors include knowledge, attitudes, beliefs, values, and perceptions. Unfortunately, knowledge is not enough to cause most people to change their behaviors. For example, people who are fully aware of the grim consequences of smoking often continue to puff away. Nor is attitude --- one’s likes or dislikes --- sufficient; an individual may dislike the smell and taste of cigarettes but continue to smoke regardless. Beliefs are more powerful than knowledge and attitudes. Researchers reported that people are most likely to change behavior if they hold three beliefs, susceptibility --- they acknowledge that they are at risk for the negative consequences of their behavior; severity--- they believe that they may pay a very high price if they don’t make a change; and benefits --- they believe that the proposed change will be advantageous to their health. The value and perception also play major roles in changing one’s behavior. Many people aren’t concerned about their health just for the sake of being healthy. Usually they want to look or feel better, and be more productive or competitive. Perceptions are the way people see things from their unique perspective and they vary greatly with age.

Enabling factors include skills, resources, accessible facilities, and physical and mental capacities. Before a person initiates a change, he/she needs to assess the means available to reach his/her goal. No matter how motivated a person is, he/she will become frustrated if always encountering obstacles.

Reinforcing factors may be praise from family and friends, rewards from teachers or parents, or encouragement and recognition for meeting a goal. Although these factors help a great deal in the short run, lasting change depends not on external rewards, but on an internal commitment to an achievement. To make a difference, reinforcement must come from within. A decision to change a behavior should stem from a permanent, personal goal, not from the desire to please or impress someone else.

Several studies demonstrated that when people took health-related actions, positive or negative, the next health-related action followed suit. One positive action taken would likely lead to another positive action, while a negative health related action would beget a negative action. For example, if an individual always wears a seat belt when he/she is in a car, he/she is more likely to wear a helmet when biking. This is because he/she has established a momentum for safe habits on the road. A study (Torabi et al., 1991) found that there was a statistically significant relationship between involvement in any varsity sport and smoking cigarettes (Table 2). Students who were active in varsity sports were less likely to smoke cigarettes as compared to those who were not involved. The finding indicated that varsity functions might discourage the use of cigarettes.

Table 2: Distribution of Students by Sports Participation and Cigarette Smoking

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Do you take part in any varsity sports?&quot;</td>
<td>253</td>
<td>1035</td>
</tr>
<tr>
<td>&quot;Do you smoke cigarettes?&quot;</td>
<td>2234</td>
<td>4497</td>
</tr>
<tr>
<td>Chi-square=444.88 (p&lt;0.01)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The opposite is also true, one bad habit can lead to another. The “gateway drug effect” explains that. The gateway drugs are the drugs that serve as the “gate” or path to the use of other drugs. These gateway drugs serve as social and psychological precursors to the use of other drugs. The decisions to use tobacco or other gateway drugs could set up patterns of behavior that make it easier for a user to go on to the other drugs which often leads to adoption of the drug-using lifestyle. Social psychologists refer to this phenomenon as a “developmental progression”. Children who decide to accept the risks of smoking later find it much easier to accept the risks of using other drugs.

The study conducted in Indiana by Torabi, Bailey, and Majd Jabbari (1993) through the Indiana Prevention Resource Center at Indiana University found a dose-dependent relationship between an increasing level of cigarette smoking and an increased frequency of binge drinking. The results showed a powerful relationship between heavy smoking and heavy drinking (Table 3). The study also examined the relationship of reported smoking behavior with use of alcohol and other drugs (Table 4), which revealed that smokers were much more likely than nonsmokers to use all drugs listed. The likelihood of using other drugs was increased, along with the frequency of cigarette smoking. These results are consistent with the results reported by the National Center for Health Statistics (NCHS).

Smokers tend to have other bad habits. A nationwide survey also showed that heavy smokers compared to nonsmokers were more likely to skip breakfast, snack more during the day, drink more alcohol, and remain physically less active. Two factors that might play an important role need noting. One is that this cluster of bad habits is associated with a consumption-oriented lifestyle --- smoking, drinking, and overeating. The other is that smokers are more prone to risk taking behaviors and give less attention to healthier practices (Pruitt & Stein. 1999) (Table 5).

Table 3: Dose-Response: Relationship Between Cigarette Smoking and Binge Drinking in Indiana Students in Grades 5-12 Percent of Students in Each Smoking Category Reporting Binge Drinking

| Rate of Cigarette Smoking Reported in Past Year | None | Few Times | 1-5 cigs. 1/2 pk 1 1/2 pk 2+ pk |
|------------------------------------------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                                | None | Few Times | 1-5 cigs. | 1/2 pk | 1 | 1/2 pk | 2+ |
| None                                           | 92.7 | 67.8      | 53.4      | 40.8 | 34.5 | 24.2 | 27.7 |
| Once                                           | 3.8  | 14        | 17        | 17.1 | 14  | 10.8 | 6.9  |
| Twice                                          | 1.6  | 7.8       | 11.2      | 12.8 | 14.2 | 18.3 | 11.3 |
| 3-5 Times                                      | 1.2  | 7         | 11.6      | 17.5 | 17.9 | 22.6 | 7.5  |
| 6-9 Times                                      | 0.3  | 1.6       | 3.7       | 7.1  | 9.5  | 10.8 | 7.5  |
| 10+ Times                                      | 0.4  | 1.7       | 3.2       | 4.7  | 9.8  | 13.4 | 39   |

Chi Square = 580.54, p = 0.01
Table 4: Dose-Responses Relationship of Cigarette Smoking with Alcohol and Other Drug Use by Indiana Students in Grades 5-12 Percent of Students in Each Category of Smoking who Report Use of Named Drug at Least Once in the Past Year

<table>
<thead>
<tr>
<th>Drug</th>
<th>Rate of Cigarette Smoking Reported in Past Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Alcohol*</td>
<td>34.5</td>
</tr>
<tr>
<td>Smokeless Tobacco*</td>
<td>7.5</td>
</tr>
<tr>
<td>Marijuana*</td>
<td>1.5</td>
</tr>
<tr>
<td>Cocaine*</td>
<td>0.3</td>
</tr>
<tr>
<td>Crack*</td>
<td>0.2</td>
</tr>
<tr>
<td>Inhalants*</td>
<td>3.6</td>
</tr>
<tr>
<td>Amphetamines*</td>
<td>1.5</td>
</tr>
<tr>
<td>Tranquilizers*</td>
<td>2.8</td>
</tr>
<tr>
<td>Prescription Narcotics*</td>
<td>1.5</td>
</tr>
<tr>
<td>Psychedelics*</td>
<td>0.7</td>
</tr>
<tr>
<td>Heroin*</td>
<td>0.2</td>
</tr>
<tr>
<td>Steroids*</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*Statistically significant at p < 0.01

Table 5: Smoking Habits and Health Practices

<table>
<thead>
<tr>
<th>Health Practice</th>
<th>Never (%)</th>
<th>Former (%)</th>
<th>Current (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never eats breakfast</td>
<td>18.3</td>
<td>19.0</td>
<td>37.6</td>
</tr>
<tr>
<td>Heavy drinker*</td>
<td>7.2</td>
<td>11.9</td>
<td>20.1</td>
</tr>
<tr>
<td>Sleeps 6 hours or less</td>
<td>20.9</td>
<td>20.0</td>
<td>25.3</td>
</tr>
<tr>
<td>Less physically active</td>
<td>17.3</td>
<td>18.1</td>
<td>21.8</td>
</tr>
</tbody>
</table>

Note: * indicates at least 5 drinkers on 10 days or more in the past year.
Source: Pruitt & Stein (1999).

EVOLUTION OF SCHOOL HEALTH PROGRAM

Health education has an ancient and complex history. Its beginnings can be located within the very foundation of civilization. Much of the early history of the profession closely parallels that of medicine and its associated sciences. In later time, particularly since 1800, the history of health education has taken on a richness and character uniquely its own.

History of school health education can be dated back to period of recognition (1850-1880) when people start to recognize that school could be used to educate/screen for disease and solve health problems. From 1880 to 1920, school health education experienced a period of exploration when children’s health problems were emphasized and funded studies were done to document these health problems. In 1910, the American Physical Education was
renamed American School Hygiene and Physical Education. In 1927, the American School Health Association was founded. Since the 1980s, more sophisticated school health education programs were developed, which brought school health education into a new era. The growing researchers in school health education demonstrated that school health education offers students not only the opportunity for improved health status, but also the opportunity to achieve a life-style that would lead to a satisfying and productive life (Porter, 1987).

**Historical School Health Model**

From the late 1880s until the late 1990s, school health programs were conceived as having three components: health education, health services, and healthy school environment (Figure 3), which still serve as a base for the school health education program today.

*Figure 3: Historical School Health Model*

![Historical School Health Programs diagram]

**Comprehensive School Health Program (CSHP)**

During the 1980s, more sophisticated conceptions of the school health program were proposed. In 1987, Allensworth and Kolbe (1987) proposed a model, the Comprehensive School Health Program (CSHP), which extended the classic triad of health education, health services, and healthy school environment to include physical education, counseling and psychological services, nutrition services, health promotion for staff, and parent/community involvement interactive components. This model (Figure 4), broadly adopted in the United States and internationally, is an organized set of policies, procedures and activities designed to protect and promote the health, safety, and well-being of students and school staff (Meek, Heit, & Page, 1996).
Figure 4: Comprehensive School Health Program

The CSHP model requires systematic coordination among eight components to magnify the benefits available in each component. In general, schools by themselves cannot, and should not be expected to address a nation’s most serious health and social problems. Collaborative efforts among families, health care workers, the media, religious organizations, and community organizations must be involved to maintain the well being of young people. The glue that could cement each component is health education. for it is the major source of the one element common to all components --- health knowledge.

School Health Coordinator (SHC)

Although professionals acknowledge that the eight program elements of the CSHP should be delivered in a coordinated, interactive manner, numerous issues regarding how this integration can be achieved --- including who at the school level should accept this responsibility and how the eight components relate to each other conceptually and logistically, have not been adequately addressed (Resnicow & Allensworth, 1996).

In essence, CSHP transforms several solo performers into an orchestra. Extending this metaphor, CSHP assumes that the aggregate of a synchronized, integrated school health program will produce a product greater than the sum total of its parts. Therefore, the actual success of CSHP hinges largely on a coordinating mechanism. However, the role of a coordinator within the eight component model has not been articulated adequately.

In 1996, Resnicow and Allensworth (1996) proposed a model -- the School Health Coordinator (SHC, see Figure 5), which is revised from CSHP. The main feature of SHC is that it set up the school health coordinator component, an essential and unifying element, into the model. The major function of the SHC component is the coordination. Its principal responsibilities include administration, integration of personnel and programs, evaluation,
and direct intervention. The direct intervention includes coordinating three program elements — health promotion for staff, healthy school environment, and parent/community involvement. Therefore these three components are considered as "second strings" which are assigned to the school health coordinator component to support and enhance the impact of the other five core elements remaining in the CSHP model. Folding these three elements into the role of the coordinator effectively reduces the number of program elements from eight to five, or six if the coordinator is considered an additional element, and thereby minimizes the number of elements which schools must adopt (Resnicow & Allensworth, 1996).

**Figure 5: School Health Coordinator**

In the SHC model, two committees are created to assist in implementing local comprehensive school health programs, the School Health Committee and the Community School Health Coordinating Council. The former comprises personnel representing five of the eight CSHP components including representatives from health education, physical education, nutrition services, counseling/psychology services, and health services. The primary functions of this committee are program planning and advocacy. With regard to program planning, the committee will ensure that the various professionals who directly influence student health, converse regularly to learn what their colleagues are doing, share teaching strategies, problem solve, and plan synergistic activities such as a coordinated classroom nutrition education and food services campaign. The committee also will contribute to curriculum selection and adaptation, as well as planning and designing inservice training programs. With regard to advocacy, this group can serve as a unified front to help ensure, on the school and district levels, that sufficient resources are allocated to the health program and when necessary, intervene when individuals or groups within or outside the school seek to eliminate or unfavorably alter the school health program.

The School Health Coordinating Council extends beyond the school and engages parents as well as representatives from the local business, media, political, religious, juvenile justice, and medical communities. The Coordinating Council ensures community support...
for the program, serves as a buffer against threats to local programs by vocal minorities, provides resource in the form of financial support and donated services, and links school-based activities to the community.

A SUGGESTED COMPREHENSIVE SCHOOL HEALTH MODEL FOR CHINA

Health Education became a required subject in primary and secondary schools in China in 1993. However, little has been reported since that time regarding the general status of school health education in China. The study conducted by Li and colleagues (2000) regarding current professional preparation of health education teachers and how health education has been taught in Chinese public schools indicated that 17 of 18 surveyed provinces provide formal health education among their middle schools. Among the 17 provinces, ten use a national curriculum while the remaining seven develop their own curricula. Nearly one third (30%) of the schools offer a one-hour health education class every week, and 60% have the class meet one hour every two weeks. It was found that current full-time health education teachers have a variety of educational backgrounds and are not likely to have had professional preparation in health education. Most have a Biology diploma (33.3%), followed by Medicine (30.3%), Physical Education (15.2%), and Health Education (15.2%). The study indicated that with the development of China’s public and school health education, the demand for professionals involved in the design, implementation, and evaluation of effective school health programs is inevitably increasing. To have a comprehensive school health program, with sophisticated curriculum, qualified health educators are needed to promote school health in China and facilitate Chinese students’ health-related knowledge, attitudes, and practices and to have an impact upon their daily lives.

The following Comprehensive School Health Education Model (Figure 6), modified based on existing school health education models implemented in the United States (Allensworth & Kolbe, 1987; Resnicow & Allensworth, 1996) and the practices of China’s education system and school health programs. Six components are included in this suggested model. They are school health education, school physical education, nutrition services, health clinics, healthy school environment, and parent/community involvement. An overview of the contents, constructs, and qualifications of each component follows.
Health Education

School health education is a planned, and sequential health instruction for grades 1 through 12, which addresses the physical, mental, emotional, social, spiritual, and environmental dimensions of health. It integrates education as a range of categorical health problems and issues at developmentally appropriate ages. The school health education curriculum should focus on not only improving students' knowledge, but also emphasizing the development of appropriate skills and positive attitudes toward health and healthy lifestyles (Koble, Kann, & Collins, 1995). The school health education curriculum should give more emphasis on the following content areas:

- Personal hygiene
- Prevention and control of diseases (infectious and chronic)
- Injury prevention and safety
- Nutrition
- Tobacco prevention
- Relationships, sexuality and family planning
- Physically active lifestyles
- Mental and emotional health
- Environmental health
- Positive attitudes toward meaningful life and living

The school health education curriculum should have the flexibility to incorporate local or regional health problems as needed.

Health instruction should be implemented by qualified, academically trained teachers and certified health educators. In order to be effective, schools should only hire those instructors having proper credentials in the field or at least having a minor consisting of 50
credit hours in health education. To have a dynamic curriculum, it is important to have the programs evaluated by regional government and school administrators so that it could be routinely revised and improved.

**Physical Education**

School physical education is a planned, sequential grades 1 through 12 curriculum which provides cognitive content and learning experiences in a variety of activity areas such as basic movement skills, physical fitness, rhythms and dance, games, team, dual, and individual sports, tumbling and gymnastics, and aquatics. School physical education should promote, through a variety of planned physical activities, each student's optimum physical, mental, emotional, and social development. School physical education should also promote enjoyable, lifelong physical activity and improve the physical and social environments that encourage and enable physical activity (Pate et al., 1995; CDC, 1997). Schools may develop extracurricular physical activity programs that meet the needs and interests of students and involvement of parents and guardians in physical activity instruction and programs for young people (CDC, 1997). Schools should hire qualified, trained teachers to teach physical education. Schools need to have a regular evaluation of physical activity instruction, programs, and facilities.

**Nutrition Services**

Cooperating with health educators, the nutrition staff serving the school should take the opportunity to promote a healthy diet among students. The ultimate purpose of nutrition services is to promote health by emphasizing a balanced and adequate eating habit. Nutrition services should provide student access to a variety of nutritious and appealing meals that accommodate the health and nutrition needs of all students. School nutrition programs will reflect the Chinese Dietary Guidelines for students to achieve nutrition integrity. The school nutrition services need to offer students a learning laboratory for classroom nutrition and health education, and serve as a resource for linkages with family. Nutrition staff should serve as role models and promote personal hygiene for students. The director of school nutrition services should have educational and professional experiences in nutrition and dietary programs. The director should also routinely provide educational programs for the nutrition services division.

**Health Clinic**

No comprehensive school health program could be complete without a health clinic. School health clinics should be staffed by qualified professionals including physicians, nurses, dentists, health educators and pharmacists. These health professionals should have experience and expertise in the areas of school health and school aged children. The purpose of having the health clinic is to appraise, protect, and promote student health. These services should ensure access and/or referral to health care services. It should also focus on prevention and controlling communicable diseases as well as emergency care for illness or injury. The responsibilities of the health clinic include cooperation with other school staff in promoting a sanitary and safe school environment for students. The health clinic staff has an important responsibility in the use of the facility for patient education and student counseling to promote and maintain individual, family, and community health.
Healthy School Environment

A healthy school environment includes the physical surroundings, psychosocial climate, and culture of the school. School environment has a significant impact on the health and well-being of school age children. Additionally, the school environment influences the success of the curriculum on children’s cognitive development. Schools should provide a physical environment free from biological or chemical agents that are detrimental to health. School administrators should provide and promote a positive and healthy environment where students feel safe and happy. Schools should encourage school staff to pursue a healthy lifestyle that contributes to the school’s overall coordinated health programs and create positive role modeling for students.

Parent/Community/Staff Involvement

School health programs could not be fully implemented without having staff and parents’ cooperation and involvement. Parents, community leaders and teachers often can and do serve as role models for students. Students serve as a linkage with school and family while parents can and should cooperate with schools to help their children. The school health program could impact parents’ knowledge, attitudes and practice regarding healthy lifestyles. Through newsletters, correspondences, meetings and volunteering, schools and parents cooperatively, and collaboratively can and should significantly impact the health and well-being of students.

Six components in the Comprehensive School Health Model should reflect six aspects of a contemporary school health program in China. Coordination of these six components could have complementary, if not synergistic, effects. All six components need to “work” together as a whole to address a health behavior or health problem, though each of the six components has its own content, constructs and qualifications in the field. Further study is needed to provide empirical evidence for effectiveness and acceptability of this suggested model.

SUMMARY AND CONCLUSION

Professionals in the health education field believe in the power of education and its potential impact on one’s health behavior choices. While major leading causes of death are widely linked to unhealthy behaviors, health professionals see the promise through prevention. However, they don’t look at the promise through rose colored glasses. On the contrary, they do recognize the coexistence of challenges and opportunities.

Unhealthy behaviors of adults are usually sewn during their childhood. Since the greatest majority of children go to school, there is no place better than schools to provide health knowledge and skills. For decades in the United States, school health education has been a major part of the educational force in promoting healthy lifestyles. School health education has advanced from providing pure classroom lectures of anatomy and physiology to implementing comprehensive school health programs. Researchers have shown that the most effective school health education programs are those following comprehensive school health program models, theory informed, sequentially designed from kindergarten to the 12th grade, and with family and community involvement.
The successful development and implementation of comprehensive school health programs and health education theories and models in the USA provide a sample profile for health education in China. The experiences that American health educators have accumulated over time, as well as the lessons they learned from their practices and research, could be an invaluable resource to Chinese health educators. This paper suggested a comprehensive school health model, which functions under the assumption that it might work in the Chinese system. Further study is needed to provide empirical evidence for effectiveness and acceptability of this suggested model. It would be of great interest to health educators on both sides to see how this model works in China as similar models work in the United States. With health becoming a global concern, why not have health education be global in task and effort?

REFERENCES


Reconsidering the Teaching Games for Understanding Model from a Situated Learning Perspective

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Abstract
Bunker and Thorpe first proposed Teaching Games for Understanding (TGfU) in 1982 as an alternative to traditional, technique-led approaches to games teaching and learning. Since then, TGfU has attracted widespread attention from teachers and coaches and, more recently, from researchers. Despite this high level of interest, there has been no attempt to review the model of TGfU Bunker and Thorpe proposed in their 1982 publication. This is a significant oversight since there have been important advances in educational learning theory and in ecological approaches to motor control during this time. The purpose of this paper is to present a new version of the TGfU model that draws on a constructivist approach to learning and, more specifically, a situated learning perspective. It is suggested that a situated learning perspective can bring together and add value to key elements of other theoretical approaches to learning including cognitive, behaviourist and ecological perspectives. The paper describes the TGfU approach, overviews recent research on TGfU and highlights a number of issues concerning the relationship between knowledge and performance. A situated learning perspective is then introduced and applied to a reconsideration of the TGfU model. The intended outcome of the paper is the provision of a more robust and sophisticated version of the TGfU model that can inform future directions in the practice of and research on TGfU.

INTRODUCTION

Bunker and Thorpe (1982) first proposed Teaching Games for Understanding (TGfU) in 1982 as an alternative to traditional, technique-led approaches to games teaching and learning. Since then, TGfU has attracted widespread attention from teachers and coaches and, more recently, from researchers (Kirk & MacPhail, 1999; Rink et al., 1996). Despite this high level of interest, there have been no attempts to review the model of TGfU Bunker and Thorpe proposed in their 1982 publication. This is a significant oversight since there have been important advances in educational learning theory and in ecological approaches to motor control during this time (Rovegno & Kirk, 1995).

There has also been a recent resurgence of interest in learning among physical education researchers. Rink (1999) has argued that instructional strategies should be based on learning theory, since without a clear understanding of how learning takes place teachers cannot expect to achieve intended learning outcomes. Bunker and Thorpe’s approach to TGfU is centered on a model of how to teach for understanding. At the same time, the model makes assumptions about the nature of learning in games, evidenced most obviously in the fact that the learner is placed at the center of the process.
The work of Rovegno (1999), Griffin et al., (1999), Kirk and Macdonald (1998) and Placek et al., (1998) has suggested that the assumptions made about learning in TGfU are broadly consistent with constructivist, ecological and situated theories of learning. From these theoretical perspectives, learning to play games can be understood as means of developing in children higher order thinking skills such as problem solving. Team games of the kind conventionally taught in school physical education, if taught appropriately, provide ideal settings for the development of such skills, with value added through the attendant physical challenges games provide. We propose that an approach to games teaching such as TGfU may have the potential to facilitate such valuable educational experiences for most if not all children.

The purpose of this paper is to retain the original structure of the Bunker and Thorpe model as an approach to teaching for understanding and to make explicit the assumptions about learning embedded within the model from a situated learning perspective. We are attempting to develop a theory of learning for TGfU that we believe is consistent with Bunker and Thorpe’s original work but that was never made explicit in this work. Our intention is to present a new version of the TGfU model that is, following Rink’s (1999) recommendation, informed by a theory of learning. The paper describes the TGfU approach and overviews recent research on TGfU. A situated learning perspective is then introduced and applied in reconsidering the TGfU model. The outcome of this review is to produce a version of the TGfU model that can inform future directions in the practice of and research on TGfU.

A Description of Teaching Games for Understanding

The Teaching Games for Understanding (TGfU) approach developed from the work of Rod Thorpe and David Bunker at Loughborough University (Thorpe & Bunker, 1989; Bunker & Thorpe, 1982). Other terms used to describe this approach include Games for Understanding and Game Sense. Thorpe and Bunker had observed that much teaching and coaching of games was dominated by the development of techniques within highly structured lessons. They also observed that in school physical education, the development of techniques took up the majority of lesson time with little time left over to actually play the game. Even when game play was included in lessons, teachers and coaches rarely made connections between the technique practices and how and when these techniques should be applied in game play. A common complaint voiced by teachers and coaches was that the techniques learned laboriously in lessons and training sessions break down in game play. Bunker and Thorpe proposed that this traditional approach to games teaching and coaching might be at least in part responsible for the poor performances of national teams compared with their international rivals.

Their response to this problem was to develop an alternative approach to games teaching and coaching that assisted players to learn the tactics and strategies of game play in tandem with technique development. Their thinking was strongly influenced by the work of Alan Wade (1967) in soccer (Thorpe, 1990). At the heart of their approach was the use of modified games. All games teaching and coaching takes place within the framework of game play. Games are modified to suit the developmental level of the player. Modifications are made to rules, playing area, and equipment. Techniques are developed using drills and other training practices common to the traditional approach. However, a technique is only introduced when the players reach a level of game play that requires the technique to be learned.
The framework for teaching games for understanding is outlined by Bunker and Thorpe in the following model. The model clearly demonstrates the priority that is given to the game form as the principal learning experience through which tactics and techniques are learned. The game form is the modification of the adult version of the game according to the players’ developmental level, including physical maturity, cognitive capacity, experience, motivation, and so on. As the players’ expertise develops, the game form is changed to continue to challenge the players in terms of game appreciation, tactical awareness, decision-making and execution of technique.

Figure 1: The Teaching Games for Understanding Model (from Bunker & Thorpe, 1982).

In conjunction with the development of the Teaching Games for Understanding Model, Bunker and Thorpe (1982) argued that some groups of games share key characteristics determined by their rules and tactics. For example, they suggested games such as:

1. football, rugby union and rugby league, basketball, netball and hockey can be categorised as invasion games since they share:
   • the common tactical features of invading territory to make space in attack
   • the containment of space in defence
   • the use of a goal or similar target for scoring.

2. net/wall games such as tennis, table tennis and volley ball share:
   • the concept of playing the shot so opponents are unable to return it
   • all players must serve and receive the ball
   • the target for scoring is on the playing surface.

3. striking/fielding games such as cricket, baseball and rounders share:
   • the concept of scoring by striking a ball into open spaces
   • fielders being placed strategically to prevent runs from being scored.
They suggested that simplified, modified and generic versions of games could be used to teach the main tactics and strategies required by each of the games in the above category. This is a particularly important consideration for teachers of physical education working within severe time constraints in schools. This suggestion does raise questions, however, about the extent to which generic game forms can allow players to learn strategies and techniques in tandem, since the techniques of most games are highly specialised. Nevertheless, this aspect of TGiU that has impacted policy in a number of countries including Britain (e.g., QCA, 1999) and Australia (ASC, 1997) and the terminology of invasion, net/wall and striking/fielding games has become commonplace in teacher talk. In contrast, it is the potential of a TGiU approach to facilitate tactical understanding in games that has attracted most attention from researchers, with only a few studies carried out to date on the possibility of transferring tactical understanding between game forms within the same category (e.g., Jones & Farrow, 1999). In the next section we summarise the research on TGiU and discuss some of the key concepts used in these studies.

Overview of Perspectives on Learning to Play Games

Following Bunker and Thorpe's (1982) advocacy for a tactical approach to games education, TGiU attracted interest among physical and sport educators through the 1980s. From the late 1980s, TGiU began to be scrutinized by researchers. Two dominant perspectives on learning to play games emerge from a review of this literature (Kirk & MacPhail, 1999). In traditional forms of practice in school physical education and within some forms of motor learning theory concerned with motor behavior (e.g., McMorris, 1998), technical proficiency is given greatest emphasis. Much of the research on TGiU takes the form of experimental studies that have compared TGiU with the forms of games teaching it is assumed to replace, traditional technique-based approaches (e.g., Oslin, Mitchell & Griffin, 1998; Griffin, Oslin & Mitchell, 1995; Turner & Martinek, 1992; McPherson & French, 1991; Lawton, 1989).

Rink et al. (1996) noted that research on TGiU has reported positive learning outcomes for students. The most powerful finding across the studies reviewed by Rink et al. (1996) is that students who have been taught from a TGiU perspective tend to perform better on tests of tactical knowledge than those who have been taught from a technique-based perspective. Some studies have suggested that a TGiU approach may be perceived by students to be more enjoyable than the technique-based approach, so students may be more highly motivated to participate (Rink et al., 1996; Kirk & MacPhail, 1999).

Rink et al. (1996) noted that, despite these positive findings, these studies have been unable to provide conclusive support for TGiU over technique-based approaches. This is due in part to different research designs, making it difficult to compare findings of studies. It is also in part due to different interpretations of key concepts such as knowledge and performance and their too simple equation with tactical and technique based approaches respectively (Thomas & Thomas, 1994).

The development of an ecological version of information processing has confirmed the inadequacy of associating a TGiU approach with knowledge and a technique-lead approach with performance and representing each as alternatives or opposites to the other. The ecological information processing approach overcomes this polarization of approaches by embracing both constructs and by adding the additional process of perception (Abernethy, 1996). The ecological version of the information processing approach to learning makes an important contribution because it shows clearly the significance of the
Reconsidering the Teaching Games for Understanding Model from a Situated Learning Perspective

processes of perceiving and deciding in learning to play games. According to Thorpe and Bunker (1989), movement execution remains a vital part of skillful physical performance within this framework.

A Situated Learning Perspective

Consistent with constructivist perspectives on learning, a situated perspective assumes that learning involves the active engagement of individuals with their environment (Rovegno & Kirk, 1995). Rather than merely receiving information transmitted from another source and internalizing that information, as some versions of a cognitive perspective would suggest, individuals actively appropriate information (Kirschner & Whitson, 1998). In so doing, they adapt new knowledge in order to fit it to what they already know (Prawat, 1999). This concern for the interdependency of learning, task, and environment or context forms an important parallel with the classroom ecology paradigm (Hastie & Siedentop, 1999).

Situated learning researcher Greeno (1997) argues that learning is situated in the sense that it is socially organized. This is particularly the case when learning is constructed and constituted by the institutional requirements of the school. For example, Bereiter (1990) has coined the term “schoolwork module” to account for the ways in which individuals respond to the institutional requirements of the school for students to be “busy, happy and good” (Placek, 1983). Additionally, learning is constructed and constituted by what Giddens (1984) refers to as the structuring properties of the society in which the school is located, such as social inequality or gender division, and the cultural resources of society, including values, beliefs and lifestyles.

Lave and Wenger’s (1991) theory of situated learning suggests that it is necessary to investigate relationships between the various physical, social and cultural dimensions of the context for learning. This is because the social nature of the learning environment and the cultural resources young people bring with them to school both construct and constitute learning. In other words, the substance of what is learned cannot be disconnected from the communities of practice that generate and sustain knowledge. A key task for schools is to provide young people with opportunities to become what Lave and Wenger describe as legitimate peripheral participants in these communities of practice, whereby they have authentic learning experiences that are valued by themselves and other members of the community of practice (Kirk & Macdonald, 1998).

A number of key points emerge from this discussion of situated learning and its potential to integrate perspectives from a range of theories of learning to play games:

- Learning is an active process of engagement with socially organized forms of subject matter (or tasks) leading to the appropriation, and thus adaptation, of knowledge;
- The learner's active engagement with tasks is embedded within and constituted by a number of contexts;
- The contexts in which learning is embedded include the immediate physical environment of the classroom, gym or playing field, social interaction between class members, institutional forms, and culture.

In the next section, we apply this situated learning framework to rethinking the TGfU model.
Rethinking the TGfU Model from a Situated Learning Perspective

In this section we consider each of the components of the Bunker-Thorpe TGfU model in turn and suggest modifications and additions based on our understanding of research studies and the key principles of a situated learning approach to games (see Figure 2). It is important to bear in mind that although we begin with the first point in the model - the game form/learner relationship - a more complete explanation of this part of the model must wait for a discussion of the final box, situated performance.

Figure 2: The TGfU Model Reconsidered

The game form-learner relationship

The first category in the model is the game and its relationship to the developmental capabilities of the learner. In most situations, consideration of the learner requires the game to be modified, and for this reason Bunker and Thorpe refer to the ‘game form’.

The model requires the teacher or coach to consider the learner and to be knowledgeable about the game form best suited to learners’ capabilities. The most obvious consideration is the physical developmental levels of the learners. Consideration of this factor has led to widespread modifications of equipment, the configuration of playing surfaces and game rules in such programs as Aussie Sport in Australia (ASC, 1997) and TOPS in Britain.
Reconsidering the Teaching Games for Understanding Model from a Situated Learning Perspective

(Youth Sport Trust, 2000). From a situated learning perspective a number of additional factors need to be considered.

It important that the teacher has some sense of what the learner already understands about the game. This includes direct experience as a participant as well as experience of the game as a spectator. Since the game form is a context in itself, it is also important from a situated learning perspective that the teacher knows something about the learner’s conceptions of learning in physical education classes (Kirk et al., 2000; Placek et al., 1998). The tasks set by the teacher that constitute the game form need to make sense to the learner in terms of his or her emerging understanding of the game (Rovegno, 1999). Such connections, between the game form and the learner’s understanding of the game, need to be made explicitly in order to overcome what Bereiter (1990) describes as the school work module. The school work form of a task tends to be remote and abstract from the learner’s experience of the task’s correlates in everyday experience outside of the school. In the case of TGfU, this means that the tasks set by the teacher need to be seen as authentic and connected to the game from the learner’s point of view.

These requirements of a situated perspective seem demanding enough when considering the relationship between one learner and the game form. The task of modifying the game and setting appropriate tasks becomes even more demanding when a group of learners is considered. Consideration of the sense each member of the group makes of the game form, of the relationship of the game form to the game, and of learning within the game form context is extremely complex. Practical issues will undoubtedly direct a teacher’s actions. However, some form of graded tasks for groups of students and some explicit contextualisation of the game form in relation to what the teacher knows about the learners’ perspectives is clearly necessary if understanding is to emerge and develop.

Game appreciation, tactical awareness and emerging understanding

In the Bunker and Thorpe model of TGfU, the categories of game appreciation, tactical awareness and making appropriate decisions appear to be self explanatory in relation to the notions of declarative and procedural knowledge. These notions are widely used in research on TGfU and expertise in sport (Rink et al., 1996; Thomas & Thomas, 1994). Game appreciation aligns with declarative knowledge, making appropriate decisions with procedural knowledge, with tactical awareness sitting somewhere between the two.

Given Bunker and Thorpe’s emphasis on the development of understanding, perhaps it is more likely that game appreciation and tactical awareness are intended to go beyond the mere acquisition of rules and other information about a game that the notion of declarative knowledge implies. The emphasis on understanding suggests that seeing the relationships between pieces of information may be more important to game performance than merely acquiring information (Aspin, 1976).

From a situated learning perspective, game appreciation might more accurately be represented as a player’s concept of a game and the ways in which it might be played. This is more than merely being able to memorise the rules, aims and so on, although these are the substance of concept development. The player’s concept of the game clearly plays an organising role in relation to all aspects of game play. As learning progresses, this concept is likely to become increasingly sophisticated. Without some concept of the game, its central purpose and the relationship of purpose to game form and the player’s role, we suggest that little progress is likely to be made in learning to play the game.
The ways in which a concept of the game may be conveyed to beginners in particular becomes an issue of key importance to teachers and coaches. The insertion in the reconstituted model of the notion of emerging understanding between the game form - learner and game concept is intended to provide teachers with a point of focus for assisting learners to make the connections between the purpose of the game, the game form and their role in the game that are required for a concept of the game to begin to develop.

Tactical awareness both feeds and is fed by a player’s emerging concept of the game. Given its central importance in TGiU, the term ‘tactical awareness’ may be somewhat imprecise in terms of identifying the assumptions about learning embedded in the model. Players don’t need to be simply ‘aware’ of tactics. They need to be able to deploy them appropriately. The notion of ‘thinking strategically’ may offer a more explicit and focused term for what Bunker and Thorpe had intended here. Strategies can of course vary in the level of their generality and specificity. There can be strategies that apply to the whole team or group and others that are more specific to individual players. The notion of thinking strategically replaces tactical awareness in our reconstituted model in order to convey a more focused and action-oriented sense of what the learner is being encouraged to do. Thinking strategically may also be more easily integrated with the notion of procedural knowledge.

Cue recognition and decision making

The category of making appropriate decisions is common to both cognitive and ecological perspectives on learning. It is perhaps here, between thinking strategically and Bunker and Thorpe’s subcategory of ‘what to do’, that the perception phase of performance should be located. An improvement in a player’s ability to discern what information is appropriate in any given set of circumstances, as a wealth of research literature on perception and performance shows (e.g., Abernethy, 1996), is a function of experience. Experience provides access to knowledge that is accumulated over time. Good players have learned from experience; in other words, they add to, continually modify and enrich their concept of the game and their strategic thinking. This knowledge provides the information base upon which players draw to recognise appropriate information in an environment. A further addition to the model to incorporate perception would appear to be appropriate.

With perception highlighted within the model, teachers then have license to facilitate cue recognition. If the ability to recognise appropriate information in a situation is dependent on experience, then players must be given opportunities to develop that experience in a variety of contexts. However, even in a TGiU approach this does not happen automatically (Kirk et al., 2000). If learning requires the active process of engagement with the task at hand within a specific set of circumstances, players need to be given explicit opportunities to learn to recognise cues.

Cue perception indeed may be a key factor linking game concept, thinking strategically and decision making. It is well established in research on TGiU that learners are able to display declarative knowledge of rules and strategies prior to displaying procedural knowledge of what to do and how to do it. However, the fact that they can recall information in a question-answer session or in a paper and pencil test but cannot display this knowledge in game play perhaps may be explained by their inability to recognise the cues that activate particular strategies, particularly those relating to positioning and the timing of actions. Links need to be made explicitly between the cues embedded in particular sets of circumstances in a game (such as a defensive formation) and the
application of specific strategies to overcome that formation (such as creating an overlap in offense).

Decision making, movement execution and technique selection

If making appropriate decisions involves perceptual activity interfacing with a stock of tactical and broader declarative knowledge, expressed in the model as game concept and thinking strategically, then decisions about how to act clearly interface with the actual execution of movement. Bunker and Thorpe’s model locates skill execution within a separate category from decision making. Thomas and Thomas (1994) claim that decision making in games is strongly influenced by knowledge of one’s own and other’s movement execution capabilities. If this is the case, it may be more appropriate to insert a mediating process between decision making in terms of how to act and the more specific process of movement execution. In other words, some elements of procedural knowledge and movement execution are understood to interface.

A key mediating notion to insert here may be technique selection. Technique selection can be understood to refer to a process of reflection on the appropriate techniques that are actually available to the player and the player’s own self-knowledge of which of those techniques she or he can execute with confidence. Again, by making this process visible within the model, teachers can address explicitly ‘how to do?’ as a process of self-reflection and selection from a range of options.

Skill development and situated performance

The interface between points 5 and 6 in the original Bunker and Thorpe model and between points 6 and 1 need to be reconsidered given the developments to the model so far. The final category in Bunker and Thorpe’s original model is performance. This category refers to normative considerations of playing games. This normative category effectively provides a means of judging the relationship between a learner’s progress through cycles of modified game forms and conventional adult versions of rules, modes of play and so on. Bunker and Thorpe consistently used the term skill to refer to an amalgam of tactical and technique capabilities in game players. Linking movement execution to performance, the notion of skill development offers itself as a useful mediating process.

Skill in this context comes close to what Bereiter (1990) describes as a “learning module”. A learning module is a cluster of related, rather than discrete or separate, capabilities. Skills as modules in this context represent clusters of techniques and strategies, with attendant movement execution and cue recognition competencies that are activated together in specific game situations. As players’ performances improve, so their ability to activate skills as clusters of techniques and related strategies becomes smoother and more seamless.

The second interface to be reconsidered is between performance and the game form-learner relationship. When Bunker and Thorpe were developing their model of TGU in the late 1970s, the phenomenon of media sport was only just beginning to emerge (McKay, 1991). Some twenty or more years later, young people’s everyday experiences are saturated with professional, commercial, hi-tech, elite adult versions of sports and games. Research has shown that this cultural phenomenon plays a significant part in shaping young people’s concept of a particular game, and so their expectations of what it will be like to participate in that game (e.g., Kirk & Tinning, 1994). Rovegno (1999) has
suggested that more attention needs to be paid to students’ conceptions of learning to play games. She claims that:

We must take students' personal and cultural experiences seriously. Students never come to school sport lessons without personal and cultural knowledge, knowledge of how sport and physical activities are portrayed in the mass media, and, with the exception of very young children, without knowledge of how sports are typically taught in schools. (p. 11)

Perhaps the notion of ‘situated performance’ might better describe this normative category, reaching out, as it does, to consider the cultural location of sport and its role in young people’s lives.

Lave and Wenger’s (1991) notion of the learner’s legitimate peripheral participation in a community of practice adds emphasis to this point. When sport is understood as a complex, multi-faceted and heterogeneous community of practice, it is possible to track players’ learning trajectories over time as they begin to understand the broader social, cultural and institutional practices that constitute games. The notion of situated performance within the revised TGFU model provides a useful point of contact between TGFU and sport education, which as Kirk and Maclnold (1998) have argued, provides an excellent example of the community of practice of sport modelled in a curriculum form.

This notion of situated performance in TGFU provides greater purchase on the notions with which we began this reconsideration of the model. These are the relationships between the game form and the player’s understanding of the game and of the learning process that he or she brings into the learning situation. Without analysis of the popular cultural forms of sport, leisure and exercise and other related phenomena such as fashion, there is little possibility that we can begin the process of TGFU with an understanding of the learner’s perspective. Nor are we likely to grasp the meaning of performance of a game for young people without the location of the notion of performance within contexts that are meaningful to young people.

CONCLUSION

The purpose of this paper has been to rethink the Bunker-Thorpe TGFU model first published in the early 1980s from the perspective of situated learning theory. We suggest that by reconsidering the model we are able to make explicit assumptions about learning embedded in this instructional model. Most valuably, situated learning allows us to consider the practical pedagogical implications of the relationships between what players learn and the physical, socio-cultural and institutional contexts in which their learning is located.

The pedagogical intent of our modifications and additions to the TGFU model should be clear. We have been concerned through the application of a situated learning perspective to make explicit dimensions of TGFU that appear, from our knowledge of the research studies and observations of teachers’ and coaches’ practice, to be omitted or underdeveloped. We believe that the interfaces between the elements of the model are worth elaborating since they make crucial links for teachers and coaches. In particular, we suggest that explicit attention to the learner’s perspective, game concept, thinking strategically, cue recognition, technique selection, skill development as the clustering of strategies and techniques, and
situated performance as legitimate peripheral participation in games elaborate the already existing but implied learning principles of the Bunker-Thorpe model.

The model has the appearance of a linear process. As Rovegno (1999) notes from her reading of the educational learning theory and motor control literature, learning in a complex medium such as games is not linear. We concur with this point and emphasise that this teaching model has embedded in it assumptions about learning, but it does not seek to represent the learning process. But since this is a model of teaching for understanding, we suggest that the structure needs to be presented in a form that will assist teachers. Here we encounter a key problem. Little of the research on TGIU has sought to investigate how teachers use the model and whether it is in fact useful to them as a model of instruction.

We suggest that a research program centered on the TGIU model in this or other forms immediately suggests itself. What is now required is a systematic examination of the model in practice and its further modification and development on the basis of this research program. If the model is to be useful as a means of guiding teaching for understanding in games, it needs to be able to identify for teachers the key moments in learning to play games that require their attention in terms of designing learning experiences.

When learning to play games is understood as a form of situated learning, we suggest that it becomes possible for teachers to address explicitly aspects of learning that have hitherto at best been understood intuitively. So, for example, through a situated learning perspective, teachers are able to address explicitly the authenticity and meaningfulness to children of the experience of learning to play games in school settings. Whether the model can assist teachers in this process of reflective teaching is now, we propose, a matter for investigation through research.

REFERENCES


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Body Composition: An Update on Older and Current Technology

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Abstract

The laboratory techniques for the measurement of body composition have been available for more than 50 years. However, the desire to obtain body composition information for the lay public has only recently become popular. This is especially prevalent with the advent of low cost body composition analyzers from Tanita and Omron. The standard procedure to determine if a person is obese is to determine their Body Mass Index (BMI). Values above 25 (kg/m²) are considered above normal. However, the efficacy of BMI as a means of evaluating relative fatness in a total population is questionable. Data from our laboratory at USC indicate approximately 10-15% of a college-age population are misdiagnosed by BMI, when compared to body composition measured by hydrostatic weighing. Bio-impedance (the prediction of fat from electrical resistance) was shown to be a more viable alternative to BMI in our research, as well as others. The classical laboratory method of measuring body composition is densitometry (hydrostatic weighing). However, this technique requires intense subject involvement (water immersion) and requires the additional measure of residual lung volume. In addition, this technique is not considered accurate for children under 15 years of age. An alternative method to measure body density by air displacement has been available (Body Box or BOD POD). However, the cost of this device is approximately $75,000 US and thus may be inappropriate for many laboratories. Dual-Energy X-Ray Absorptiometry (DXA) is another fairly recent laboratory technique. This method employs the use of X-Rays to measure tissue density. The method appears to have promise, but again, the cost of the device is well in excess of $120,000 US. Bio-impedance devices have the benefit of being both inexpensive and portable - useable in the field as well as the laboratory. The classical method of measuring body composition by this technique is to measure electrical resistance of the body from hand to foot (total body). This method has been shown to have SEE of approximately 3-4% body fat, when compared to hydrostatic weighing. Two new impedance analyzers, the Tanita and Omron, measure electrical resistance regionally, across the legs (Tanita) and arms (Omron). These analyzers are inexpensive ($100-200 US) and easy to use, making them ideal for the general public. Our research has shown these analyzers to have substantial variability. Of a college-age population of 200 students, almost 40% of these subjects had predictive errors (compared to hydrostatic weighing) of ≥5% body fat. Anthropometry such as skinfolds is another viable technique and is perhaps the most popular choice for health clubs and fitness
trainers. Skinfolds may also be the most accurate estimate of body composition for young children.

INTRODUCTION

Techniques for predicting body composition have been available for almost fifty years. However, only in the past decade has there been such a great popularity for this measure outside of the research community. Today, body composition assessment is extremely popular and valuable for many groups, including: athletes, children, dieters, obese subjects, anesthetic and renal patients. The classical use of a person’s stature and weight to evaluate overall health leaves a great deal to be desired. In the United States, the Metropolitan Life Insurance tables have been used for many years to indicate the level of under or overweightness of a subject. In 1983 these tables were modified to include frame size (small, medium, large) as a further category. However, the most common height-weight measure that is used to evaluate relative fatness or thinness is the Body Mass Index (BMI = Mass (kg) / Height (cm$^2$)). Values of 18-24 are considered to be normal, whereas values of 25 or above are considered to be overweight. The importance of the BMI has been illustrated by the curvilinear relationship between mortality (all causes) and the BMI. In fact, most studies illustrating the relationship between obesity and disease have used the BMI.

BMI AND HEIGHT-WEIGHT TABLES

In order to test the efficacy of the BMI to accurately identify overweight or obese subjects we tested 343 males and 426 females at the University of Southern California. These subjects were measured for body composition using hydrostatic weighing (densitometry) and bioimpedance. The criteria for identifying if a subject was truly overweight was a percent fat value >20% (males) and >30% (females). Utilizing discriminant function analysis to compare the evaluation determined by BMI, the following results were found. False positive tests (FP) were 10.6% for males and 13.1% for females. This means that about at least one in every ten subjects is categorized as being overweight by BMI, but in fact is normal by body composition criteria. The number of false negative tests (FN) was more disturbing. FN was 26.4% for males and 19.6% for females. A FN test means that a subject’s BMI is less than 25, but in actuality has a high body fatness (Girandola, Contarsy, & Wiswell, 1991).

While height-weight values are valuable and the BMI is a reasonable estimate of overweightness, we feel that a measure of body composition is invaluable. There are many methods that can be utilized to evaluate this body component. Many of these techniques require very sophisticated and expensive instrumentation, many can be performed quite accurately in the field and have relatively low cost.

ANTHROPOMETRY AND BIOIMPEANCE

Anthropometric evaluation includes skinfolds, circumferences and diameters. Perhaps the most popular method to measure body composition is by the use of skinfold fat. This technique has been validated against hydrostatic weighing and is considered to have a SEE of approximately ± 4%. The positives for the use of skinfold include: low cost, ease of use, speed, and applicability to all age groups, including children. The negatives include: formulas may be population specific, technician skill and reliability may be an issue, and
this technique is useless in extreme obesity (fat folds in excess of 100 mm). The use of anthropometry is valuable because, together with girth measures, it can give the subject a relative starting point in order to look at changes in body composition (Lohman, Roche, & Martorell, 1988; Roche, Heymsfield, & Lohman, 1996).

Bioimpedance is a relatively new technique that was developed about 20 years ago as a method to predict total body water. Basically, a small electric current of 800 uA at 50kHz is cycled through the body and the resistance to this current is measured at an electrode site. Since water and electrolytes readily conduct electrical current there is a somewhat inverse relationship resistance and total body water. Using the standard of 73% body water for the Fat-free mass (FFM) one can then predict the FFM using the bioimpedance method. A number of validation studies have compared body composition predicted by bioimpedance to that predicted by a criterion method - usually hydrostatic weighing. The majority of these studies have found that bioimpedance can predict body composition with an accuracy of ± 4% fat (SEE). Our research on approximately 1000 students revealed similar standard errors of estimate and validation coefficients of approximately R=0.80. Conclusions from a meeting on the applicability of bioimpedance to predict body composition held at the National Institutes of Health (NIH) in the USA (National Institutes of Health, 1994) indicated that this technique was both valid and reliable. However, several concerns were raised at this meeting, which have been further reviewed in subsequent papers. These were raised as possible concerns:

1. room temperature and skin temperature
2. cleanliness of the skin surface upon placement of the electrodes
3. position of the subject (supine, sitting, upright)
4. level of hydration of the subject

It was found that all of these factors affected the accuracy of the impedance reading, with special concern for the hydration of the subject. Since the methodology is based upon body water then any deviations from euhydration (normally hydrated) would create an error in the outcome.

The standard impedance measurement requires electrodes to be placed on the ankle and foot, so that impedance is measured across the entire body. Most of the standard impedance devices are in the $1,000+ (US dollars) range, and thus not economical for the general public. However, over the past few years two other impedance devices have been available. These are relatively inexpensive analyzers costing about $200 (US dollars), making it almost ideal for the lay public. One of these devices is made by Tanita Corp, it is a stand on scale with metal foot electrodes. Information entered in the equation include height, age, and gender (athlete vs non-athlete, adult vs child, in some models). Impedance is measured across the lower extremity, from foot to foot. A recent study by Nunez, et al. (1997) touted the accuracy of this method, relative to DEXA. Another recent addition to the field was from Omron, Inc. This is a hand held bioimpedance analyzer where the subject holds metal electrodes in both hands. Variables include height, weight, age, and gender. The accuracy of this device was recently touted Loy, et al. (1998).

We recently tested several bioimpedance devices, as well as a Futrex 5000 (near infrared ineractance) and compared them to body composition measured by hydrostatic weighing. We tested subjects for body composition using bioimpedance devices by Omron, Tanita, and BioAnalogics (standard arm-leg electrodes). Our results indicated that while the standard arm-leg impedance is reasonably accurate in predicting body composition, the Omron, and Futrex leave a lot to be desired. We tested 159 subjects, 104 females
and 55 males. Average body fat for the males was 15.6% and for the female group, 24.6%, as determined by hydrostatic weighing. Correlations between hydrostatically determined body fat, and the other techniques ranged from R=0.41 (female: Futrex) to R=0.82 (female: Omron). The standard error of estimates (SEE) ranged from a low of 3.33% (females: Omron) to 5.45% (males: Omron). Further analysis revealed some very interesting results. We calculated the NUMBER of subjects that had predicted fat values GREATER than 5% body fat from the criterion method of hydrostatic weighing. For the males (N=55), the Omron and Futrex had the greatest frequency of errors (25 and 22 respectively). For the females (N=104) the Tanita and Omron had the greatest frequency of errors (57 and 62 respectively). We found that of the bioimpedance methods, the standard method using arm leg is a more appropriate method of measuring body composition (Girandola, Park, Mattar, & Chin, 1999).

Bioimpedance offers a fast and convenient method to measure body composition, but it is important that care is taken with environmental conditions. What we have found regarding the prediction of body composition by bioimpedance is that the BEST accuracy occurs at the average percent fat values (males=15%; females=25%). The greatest errors or deviations are found to occur at the extremes body composition, that would be approximately 2-10% fat (males) and 10-20% fat (females). More data are needed using bioimpedance devices, especially in children and athletes.

HYDROSTATIC WEIGHING

Hydrostatic weighing has been available as a technique for predicting body composition since the 1960’s when formulas to predict fat from density were published by Siri and Brozek (Roche, Heymsfield, & Lohman, 1996). This technique is basically a laboratory method, although there are opportunities to test subjects in the field, using a scale and a swimming pool. We have performed this method in public schools and it has also been carried out in professional football camps. However, under ideal conditions it should be performed in a stable body of water, using an accurate scale for the water weighings. In addition to the underwater weighings the measure of residual lung volume must be taken simultaneously. Residual lung volume (RLV) can be measured using the nitrogen washout or the oxygen dilution method. Helium dilution is another option. The following assumptions are important in predicting body fat using hydrostatic weighing.

a. The densities of the constituents of the body are relatively constant from person to person.
b. The proportion of the constituents other than fat or adipose tissue are relatively constant from person to person.
c. The person being measured differs from a standard reference body only in the amount of body fat.

While hydrostatic weighing is considered to be an accurate and reliable laboratory technique for predicting body composition, there are some drawbacks. It requires the greatest amount of subject involvement. Subjects must perform maneuvers for residual lung volume. They must perform expiratory functions while being submerged in water. a technique that many subjects find oppressive. Of approximately 10,000 hydrostatic weighing that we have carried out at USC, approximately 2-4% could not be done, due to technique errors. Finally, there are some subjects that are NOT good candidates for predicting body composition by hydrostatic weighing. This would include children under the age of 15 years and the elderly, both males and females, over the age of 70 years. The
reason for this is due to potentially large differences in the density of the fat-free mass, which is considered to be 1.10 kg/liter.

Hydrostatic weighing is considered to be a highly reliable technique with fairly small prediction errors (2-3%) and thus can be utilized to evaluate small changes in body composition. This is something that is virtually impossible using skinfolds or bioelectrical impedance. It is the only prediction method that has been validated against cadaver data (Roche, Heymsfield, & Lohman, 1996; Lohman, 1992).

A fairly recent device, termed the ‘Bod Pod’ has been suggested as a potential replacement for hydrostatic weighing. It employs the principle of plethysmography which uses air displacement to measure body volume, rather than water weighing. Several studies have recently been published validating this methodology as compared to hydrostatic weighing. This method compares favorably to the classical technique of hydrostatic weighing. The only drawback to this methodology is the cost of the Bod Pod which is in the area of almost $50,000 (US) (Roche, Heymsfield, & Lohman, 1996; Wagner & Heyward, 1999).

**DEXA**

A fairly recent methodology to measure both total, as well as regional fat, is the Dual Energy X-Ray Absorptiometry (DEXA). This method makes use of very low radiation to measure the density of various tissue. The device was developed primarily to look at bone mineral content - which is its primary purpose. Utilization to identify bone mineral density and identify the potential for osteoporosis. However, over the past several years, software has been developed to predict both regional as well as total body fat. The obvious benefits of this method for predicting body are obvious. First, this is one of the few techniques available where regional fat can be identified and quantified. Secondly, it should be independent of age and gender, since it would take into consideration the variation in mineral density that affects accuracy in hydrostatic weighing. Several studies have shown that body composition predicted by DEXA is very similar to that measured by hydrostatic weighing. The one major drawback of this methodology is the cost. These devices (produced mostly by Lunar and Hologic) are in the $100,000+ (US dollars) range. In addition, service contract costs become exorbitant (Roche, Heymsfield, & Lohman, 1996).

**SUMMARY AND CONCLUSIONS**

Due to the remarkable increased incidence of obesity, worldwide, it is imperative that students understand the importance of achieving and maintaining appropriate weight for height. The use of height-weight tables that are adjusted for gender and age are very important. The use of Body Mass Index is also warranted. However, the employment of devices that can measure body composition with reasonable accuracy is imperative in order to give both children and teachers a more appropriate means of determining their nutritional status. Based upon our research and that of others, the use of skinfolds and bioimpedance measures in the field are excellent techniques with reasonable accuracy. In the laboratory environment, hydrostatic weighing has been shown to measure body composition with very good accuracy and reliability at a very reasonable cost.
REFERENCES


Conference Papers on

INTERNATIONAL PHYSICAL EDUCATION, SPORTS AND SPORTS SCIENCE
Globalisation of Physical Education and Sport Science

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Abstract
Globalisation has become a key word in many areas of society, especially with respect to economical and political developments. Clearly a trend towards globalisation can also be identified in sport, sport science and physical education. Sport in its broadest meaning and with its many facets is challenged to search for and keep its place as a part of culture, education and science. Recent initiatives on the international level will be highlighted including the World Summit on Physical Education and the results and recommendations of MINEPS III. In addition, new developments in sport science, especially with regard to increased specialisation and the urgent need for improved cross-disciplinary communication and cooperation will be presented.

In this world-wide process networking and advocacy are of crucial importance. International organisations, such as the International Council of Sport Science and Physical Education (ICSSPE/CIEPSS), and their partners such as the IOC, UNESCO, WHO etc., have specific responsibilities and tasks to fulfill. Currently, the major challenges include making scientific and educational contributions to the global crisis of physical education, the doping issue, Agenda 21, elite sport, the Sport for All movement, and traditional sports and games. Quality research and quality training of professionals in sport science and physical education are essential for future developments and need to be supported both on the national and global scale.

INTRODUCTION

Today's societies are challenged by many political, economical, cultural, technological, and social changes. Globalisation has become a key word, affecting almost all areas of society. Among the specific changes and challenges with regard to physical education and sport science are: “the rise of health on the modern value scale, the rediscovery of the body, the aging population, individuals with disabilities, the commercialisation of sport, the development of multi-cultural societies, the changing roles of schools, and sport organisations in society” (Doll-Tepper & Brettschneider, 1996).

Education, understood as a lifelong process, is of highest priority, because well-educated people will be able to adapt more easily to the demands of today's and tomorrow's world. In this context, physical education and sport should be seen as an integral part of these developments.
DISCUSSION OF RELEVANT ISSUES

The Changing World of Sport

The world of sport clearly reflects the trend towards globalisation. Almost daily we can watch world events in sport, the annual calendar of championships, world cups etc. has reached vast dimensions.

At the same time, new sports, so-called “trend sports”, are being introduced, such as solo-climbing, apnoe-diving, heli-jumping, hot rocket bungee etc. offering the “ultimate kick”. It seems that the desire to face danger and adventure in sporting activities is ever growing, impressive examples of a trend toward individualisation.

On an international scale, it is also important to note a growing interest in rediscovering and preserving traditional games and sport, as only recently shown at the 3rd World Festival of Traditional Games and Sport in Hanover, Germany. The “Sport for All” movement is increasingly offering more opportunities for active participation, very often emphasising cultural traditions (Palm, 1991).

Taking these developments into consideration, sport has to be described as extremely divergent and it can be assumed that the future of sport will continue to be full of contradictions.

A current analysis shows that sport is no longer perceived by the public just to be positive. Many people outside sport when asked about sport, associate it with money, violence and doping. Very often they are reminded of their own experiences with physical education in their school days, which does not always bring positive memories. It is therefore necessary to address these issues realistically and emphasize the unique and beneficial contribution of physical education in the educational process of all individuals, rethink the current approaches and when appropriate – redirect the course.

The Indispensability of Physical Education

In many countries, mainly due to modern technological developments and changes in lifestyle both children and adults have become less physically active. At the same time, as a consequence of restricted funding in many countries around the world governments have failed to support physical education in the schools. Numerous studies from around the world have given scientific evidence for the benefits of physical education: health benefits, disease prevention, cognitive developments, social behaviour and fair play, social skills acquisition etc. Physical education is an indispensable essential school subject, because it is “the only school subject that is directed to physicality, movement, games and sport. As such it gives children opportunities to acquire not only a wide range of movement competencies, but also allows them to develop their own embodied identity and to understand and appreciate the embodied identity of others. It enables them to acquire the knowledge and insights that are needed for an independent and critical engagement in physical culture” (Feingold, 1999).
Globalisation of Physical Education and Sport Science

Linking School Physical Education to Community

Despite differences in the structures of the educational and sport systems, there is a growing trend towards linking school physical education to sport activities in the community and in clubs (Figure 1).

Figure 1: Linking School Physical Education to Community and Clubs

In many countries around the world new co-operation models have been initiated to better serve the needs and interests of young people. Various programmes and projects exist, either focusing on competitive sports or on recreational activities, such as inline skating or mountain biking. Many of these initiatives exist especially on the local level, offering opportunities for children with different cultural backgrounds or for those with disabilities. They all require well-trained and committed professionals of physical education and sport.

Professional Training-New Challenges

Although some institutes and departments still have a strong focus on the preparation of physical education teachers, there is clearly a trend towards more specialisation in the various branches of sport science. Amongst the specialisation areas are: exercise physiology, sport psychology, sport sociology, sport pedagogy, biomechanics, motor development/learning, sport history, sport philosophy, sport facilities, sport information and documentation, adapted physical activity, sport law, sport management, sport economics etc. (ICSSPE, 2000).

We are all challenged to contribute to connecting the various sub-disciplines and to develop a clear focus on inter-/crossdisciplinary teaching and research. From an international perspective, it can be said that we are standing at a crossroads, with signposts such as health sciences (e.g., public health), sport science (including physical education) and cultural sciences.

The Importance of Research

For the future development it is of crucial importance to provide an improved scientific knowledge base and to make scientific knowledge available, not only at the national, but...
especially at the international level. In this context, the International Council of Sport Science and Physical Education with its worldwide network and partners, such as UNESCO, the IOC, WHO and FIMS plays a leading role. In a globalised world, professional communication and co-operation are essential, e.g. in conducting and supporting scientific research, carrying out joint initiatives and in providing most recent findings by means of publications (Figure 2).

Figure 2: ICSSPE’s International Network

International Co-operation in Physical Education

Based on an initiative of the International Council of Sport Science and Physical Education (ICSSPE) Hardman and Marshall (2000) carried out a world-wide audit about the state and status of physical education. The project was undertaken in co-operation with the International Committee of Sport Pedagogy (ICSP), a committee within ICSSPE, consisting of five international organisations: the Federation Internationale d’Education Physique (FIEP), the Association Internationale des Ecoles Supérieures d’Education Physique (AIESEP), the International Association of Physical Education and Sport for Girls and Women (IAPESGW), the International Society of Comparative Physical Education and Sport (ISCPES) and the International Federation of Adapted Physical Activity (IFAPA) and supported by the IOC.

In November 1999 – on the occasion of the World Summit on Physical Education held in Berlin (Germany) – the results of the audit were presented. In addition, representatives from governments and non-governmental organisations discussed various aspects, such as nutritional, economical, social and health-related issues, of physical education.
The World Summit was organised by ICSSPE, received the patronage of UNESCO and the IOC and was co-sponsored by WHO. At the end of the conference, the participants unanimously adopted the “Berlin Agenda for Action for Government Ministers”: “The World Summit on Physical Education reinforces the importance of Physical Education as a life-long process ... All children have the right to (1) the highest level of health; (2) free compulsory primary education for both cognitive and physical development; (3) rest and leisure, play and recreation. “

The results and recommendations of the Berlin World Summit on Physical Education were presented at UNESCO’s 3rd International Conference of Ministers and Senior Officials Responsible for Physical Education and Sport (MINEPS III) November 30 – December 3, 1999 in Punta del Este (Uruguay).

In the final declaration of Punta del Este it is stated: “The Ministers reiterate the importance of physical education and sport as an essential element and integral part in the process of continuing education and human and social development” (UNESCO, 1999). In this respect, reference is being made to the Berlin Agenda for Action. “... Studies undertaken at international level indicate that $1 invested in physical education leads to a saving of $3.2 in medical costs. In this context (the Ministers) ... endorse the Berlin Agenda for Action adopted by the World Summit on Physical Education in 1999” (UNESCO, 1999). In addition, recommendations addressed a variety of other important issues, including sport and the environment, elite sport, doping, sport for all/traditional games and sport as a contribution to a culture of peace.

CONCLUSION

Outlook for The Future

We are clearly facing enormous changes and challenges, in society in general, and specifically in physical education and sport. Quality physical education, the highest level of professional training and quality research, both disciplinary and cross-/interdisciplinary, are indispensable components for future developments. It is our task to formulate suggestions and recommendations which can serve as an agenda for renewal and action in physical education and sport science for policy-makers and officials at the highest levels. Experts from around the world, under the leaderships of ICSSPE and its International Committee of Sport Pedagogy (ICSP) are currently working on a Berlin Agenda II in order to orchestrate the efforts especially on national level.

Working together collaboratively and building new alliances and partnerships will be the key to success in a globalised world. The participants of the International Conference for Physical Educators in Hong Kong are invited to be part of joint efforts to develop further and secure quality physical education and to build bridges between physical education and sport science.

REFERENCES


Recent Trends in Physical Education in the United States

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Abstract
Connection to societal issues has become the focus or change in direction and mission in the United States in the past decade. The change is a significant one because it connects what we do in the schools to adult lifestyle and behaviors. These behaviors relate to a more healthy, active lifestyle for adults, one that includes, besides more activity, better nutrition, non smoking, less drug abuse, and less stress. In addition to a more active lifestyle, it includes the development of personal living skills, which includes more cooperative behaviors, more sensitivity to those of other cultures and skills, willing to share, respect others, as well as self-responsibility and work ethic.

Both the active lifestyle and personal living direction implies that when one teaches physical education, one is focusing more on the process of the activity rather than the outcome. In other words it is not how fit one is, but how active one is; it is not who wins and who loses a game, but the process of playing and learning the game that counts.

This philosophy has been endorsed by most State Education Departments throughout the United States. After all, if citizens are more active and eat better, it can be anticipated that they will have less illness over their lifetime. It has been concluded in the State of New York alone, one year less illness over a life-time will save 3-5 billion dollars a year in health care costs.

The presentation will present the new direction (connection to societal issues), supportive research and sample pedagogical plans for implementation.

INTRODUCTION

As the title of the paper suggests, recent directions of physical education in the United States will be presented. It is the view of the author that the current directions in the United States indicate that WE ARE AT A SIGNIFICANT CROSSROAD IN OUR PROFESSION as we impact the schools. A recent "Summit of Physical Education", held in Berlin, November, 1999, proclaimed the significance of physical education, yet echoed the same concern as we enter the new millennium.

While riding a very positive wave of support from research (Boreham et al., 1997; Al-Hazzaa et al., 1994; Thune et al., 1997; Parker & Bar-Or et al., 1991; Shepard, 1997) on the health benefits (physical, mental, social and cognitive) of physical activity, as well as from government agency support, including the Centers for Disease Control (CDC),
Surgeon General’s Office, and most recently a letter of support from President Clinton, in addition to support from American Medical Association (AMA), American Heart Association, and American College of Sports Medicine, we are still in the midst of fighting cutbacks, if not our own survival.

In appears obvious today that our status in the schools is dependent upon our impact or importance to society or Connections to Societal Issues. It was obvious from the Summit in Berlin that physical education in many countries is in jeopardy, partly because of the lack of knowledge regarding its importance to society. Unfortunately, many in our own profession do not understand the importance of physical education to society and the positive lifestyle of all children.

The importance of physical education in the United States has changed over the years. At one time in the 1940s-60s we were to train soldiers for war, in the 1970s and 80s to train athletes to compete in the cold war Olympics, or to play games as a recreation outlet from the academic subjects. Now, as we enter the new millennium, our importance has changed to the connection we make to societal issues and lifestyle (Feingold, 1994).

What follows are some of the current issues that parents and citizens face in the United States as indicated in Table 1:

**Table 1: Issues in Society**

| * | Standard scores on academic subjects - get into college |
| * | Crime and Drug Abuse |
| * | Business Loss - mediocre |
| * | Unstable family - over 50% one parent |
| * | Health Care Costs -- increasing |
| * | Accountability of Schools |
| * | Violence in Schools |
| * | Economy |

In 1990, the New York State Education Department asked all disciplines to describe how one would behave as an adult if they went through your discipline. This question is significant because it places importance of what is done now on the long-term behaviors of the participants. For example, it places the role of fitness for children in perspective. Is it of value to force children to become physically fit and end up hating exercise and physical activity the rest of their lives? Or should we strive to get children to love physical activity and be able to make better decisions about their nutrition and activity for the rest of their lives? The pedagogical changes and program development changes become significant when considering this question. At the time, an attempt to connect what we do in physical education to those issues noted above in Table I were addressed. In so doing, two arguments were made, one relating to health care costs and disease prevention, and the other related to personal living or social skills. Thus, as one looks to adult behaviors and our importance to societal issues, the development of a physically active positive lifestyle becomes paramount rather than the development of fitness and sport skills.
HEALTH CARE COSTS AND PERSONAL LIVING SKILLS

Behaviors include healthy and active lifestyle

One who participates in the program should be able to make better decisions about one's health, as well as develop positive attitudes about physical activity. Thereby, one is able to develop and adjust their own personalized activity and nutrition plan.

The second thread is the development of PERSONAL LIVING SKILLS, such as cooperation, respect for others, work ethic, willing to share information, -- in other words develop one into a good, honest and ethical parent, business manager, employee - a credit to the community and one who cares about others.

WHAT WE ARE ABOUT IS OUR CONNECTION TO SOCIETY

Health Care Costs. Through the development of an active healthy lifestyle it is estimated that we can save 3-5 billion dollars a year in health care costs in New York State alone (Feingold, 1994). These figures were extrapolated from the federal government figures:

1985 -- 220 billion
1990 -- 660 billion
1992 -- 880 billion
2000 -- 1.6 trillion
(Feingold, 1994).

An active lifestyle is supported by the American Heart Association, American Pediatric Society, American College of Sports Medicine, Centers for Disease Control, U. S. Surgeon General, and the President of the United States (Bill Clinton). In addition, hundreds of studies support the role of physical activity. There are a number of questions that have been raised regarding the health of our children. Does what we have been doing in the schools promote physical activity or provide a negative experience for children? Do we promote active and healthy lifestyles or do we promote winning, and the promotion of the most talented only? Are we teaching students how to develop their own personalized program in a fun and interesting way? Are we teaching them about their body, about exercise, about nutrition, etc.? It is unlikely that these abilities and traits will be developed through traditional programs in which one throws out the laps, promotes pain or no gain, presents boring lectures, and compares one against another.

NEW PROGRAM IMPLEMENTATION

Physical Best - Physical Best's latest revision (1998) is a comprehensive fitness education program developed by AAHPERD. It includes new curricular materials (k-12), physical activities that promote the learning of health related fitness concepts, and a computerized assessment system. A few examples include: having children run through the cardiovascular system, run through the heart chambers, and learn a muscle a day.

Project SPARK, developed by Sallis and McKenzie (1999), promotes a similar philosophy in their new curriculum. Much of the work of Charles Corbin (1998) on his fitness concepts curriculum at the secondary level embraces a similar philosophy.
PHYSICAL HEALTH BENEFITS

What follows are recently reported health benefits as indicated in Table II.

Table II: Health Benefits of Moderate Activity

<table>
<thead>
<tr>
<th>Benefit</th>
</tr>
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<tbody>
<tr>
<td>50% decrease from the risk of dying from CVD (AHA - 4th Risk)</td>
</tr>
<tr>
<td>Decreased risk of colon and breast cancer</td>
</tr>
<tr>
<td>Decreased risk of osteoporosis and diabetes</td>
</tr>
<tr>
<td>Reduce blood pressure, blood fats (tri, cholesterol and LDL)</td>
</tr>
<tr>
<td>Increased enzymes that convert LDL to HDL</td>
</tr>
<tr>
<td>Increased insulin sensitivity</td>
</tr>
</tbody>
</table>

MENTAL HEALTH BENEFITS

Perhaps the greatest impact of physical activity will not be the physiological changes, but instead the mental health benefits, including reduction of stress, enhanced feeling of well-being and self esteem, and reduction in depression (Biddle, 1995).

COGNITION

More recently, research has shown the positive results of physical activity on academic performance such as math, reading, and problem solving (Shepard, 1997; Sallis & McKenzie et al., 1999).

Thus, we have moved from a traditional way of thinking - to get children fit at all costs, to the model exhibited in Physical Best - health related, personalized, and positive experiences.

PERSONAL LIVING SKILLS - The other major thread within the lifestyle or connection to a societal model is the development of personal living skills. The impetus for educational reform came from business and their complaints about education. They indicated that their employees could not cooperate, appreciate others of different cultures, could not share, lacked work ethic, and lacked values. Instead, it was a "me first" or "quick win" attitude that prevailed, without valuing how to work for a goal or victory. Concepts regarding cooperation, cultural awareness, respect for others, caring and self-responsibility could and should be taught within a physical education setting. In fact, for many of us, it was supposed to have been done. Judy Rink (1999), at a recent presentation in Besancon, France, indicated that teaching and learning is specific. That is, if one is to expect cooperation as a desired outcome, then one must teach cooperation. It does not happen automatically by simply playing games by themselves. The key is to focus on the process, to focus on the events in the game, not on the outcome of winning. We have spent too much time "teaching games", instead of "teaching through games". In the 1920s physical education became part of education in the schools as "education through the physical". At the time there were no televisions and families were largely intact. Today, children in the United States need education and a values system. With the current complex society as well as the breakdown of the family structure, the role of physical
education becomes increasingly important in the development of personal living skills. There are few subjects in the schools that can have this significant effect on children. The gymnasium can be considered a gymnasium about life.

**Recent Programs and Curricular Strategies that Relate to Personal Living Skills**

Siedentop’s Sport Education Model (1999) teaches leadership, cooperation, caring, problem solving, and respect for others through the sports education model.


Binder, et al. (2000) prepared curricula on Olympic values for the Foundation of Olympic Sport Education (FOSE). The elementary curriculum focused on themes related to values and personal living skills, such as respect for others, diversity, cooperation, play for all, excellence in performance, and Olympic ideals.

Project Adventure is an outdoor, wilderness ropes course that teaches trust and group activities.

**HOW PHILOSOPHY IS REFLECTED IN SCHOOL PE**

In summary, this philosophy (connection to society and lifestyle issues) is reflected in the schools as indicated in Table III.

**Table III: Implementation of Philosophy**

| * | Fitness vs positive experiences in physical activity (love to be active) |
| * | Fitness concepts taught through activity |
| * | More authentic assessments vs fitness test score -- activitygram, personalized plan |
| * | Focus on the process -- games and activities on cooperation, leadership, problem solving, caring for others -- gym a lab about life vs who wins |
| * | Increased connections to others disciplines vs being isolated and unique |
| * | Physics -- biomechanics of running, jumping, Science -- exercise physiology labs |
| * | History, culture, philosophy sport and games - Olympics |
| * | Role of physical activity -- cognitive development (pre-school) |
| * | Career options -- work with adults and the elderly |
| * | View teacher as exercise and nutrition specialists |
| * | Technology -- enhanced lab experiences -- software for computers |
| + | Community connections -- raising the whole child -- opening doors to the public |

**What about higher education?**

If these are the expectations of schools, the preparation of teachers needs to change. Too often, one teaches theory in the classroom and methods of teaching different sports in the gymnasium. The student is forced to make the connection. Perhaps it is better to infuse theory into the methods of teaching courses. In the Adelphi model (Barrette et al., 1993)
and (Fiorentino et al., 1993), within each methods of teaching course, as in basketball methods, one learns how to teach fitness concepts, values, and disabilities through basketball. The same is true in teaching volleyball, tumbling, etc. Significant change has occurred in the students preparing to be teachers; students are now focusing more on the process, as well as on the techniques of performing the various skills (Kowalski, 1996; Fiorentino, 1994).

**SUMMARY**

In the United States the future direction of physical education is towards connecting what we do to societal issues, to look into adulthood and lifestyle education, to focus on the process rather than outcome, and to develop a more positive experience for all students, not just the most talented.

**REFERENCES**


"Sports Science Education" in Nagano Olympic Games: Aim and Concept for Physical Education

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Abstract
The IOC Medical Commission has continuously engaged in research activities since the Los Angeles Olympic Games (1984). The object of this project was to scientifically analyze the techniques of athletes during Olympic competition, discover the secrets of superior sports performance, and pass this information to future athletes and coaches. It is also hoped that these results will contribute to providing an environment where athletes can perform to the best of their ability while being protected from injury.

The new project of the "sports science education" started in the Nagano Winter Olympic Games, under the supervision of the IOC Medical Commission. The Hiroshima University directed the project, including the basic research as well as the "sports science education".

In the "sports science education", 28 exhibition panels and 5 videos covering various Olympic sports, performance techniques, and sport science information were prepared and exhibited at competition venues in Nagano as well as at elementary and junior high schools in the Nagano region. Many students and citizens of Nagano have viewed these materials.

The present paper will present information about the "sports science education" program which started at the Nagano Olympic Games and was designed to complement school physical education. The "sports science education" program also benefits both coaches and athletes.

INTRODUCTION
There are many aims of school physical education, including the promotion of regular physical activity, health care, sports skills, and even communication skills, etc. Beside the activities of physical education in schools, there is the research field of sport sciences. Research in sport sciences includes the basic study of human movement, safety in sports, as well as developing performance and strategy. Biomechanics and physiology of sports are two basic sciences which strongly relate to teaching sport and physical education in the school. The knowledge and results obtained from research in these basic sciences may be used to support teachers in schools, just as it supports coaches or trainers in competitive sport events.
The present study was performed under the notion that the most advanced knowledge in sport science should be introduced to teachers of physical education and also to school children. The IOC Medical Commission has opened a way for supporting these ideas in the Nagano Winter Olympic Games in 1998.

PURPOSE

The purpose of the present paper is to introduce the basic idea of ‘Sports Science Education’ from the Nagano Olympic Games in 1998 and describe the procedures of the project.

The author has studied biomechanics and physiology of sport for supporting members of the Japanese national ski team since the Sapporo Olympic Games in 1972. The basic model of skiing research in Japan is shown in Figure 1 (Watanabe, 1981).

The basic scientific study of biomechanics, physiology, and other sciences has been integrated into “Ski sciences” which supports recreational skiing, competitive skiing, as well as skiing in physical education. The ‘sport science education’ in the 1998 Nagano Olympic Games started under the auspices of the IOC Medical Commission, but the idea of developing the relationship between the sport scientist and the school teacher of physical education was already proposed in 1981 as shown in Figure 1.

*Figure 1: The Diagram of the “Sports Science Education” Based on the Integrated Ski Science (Watanabe, 1981)*
PROCEDURE

Biomechanics research projects have been conducted at every summer and winter Olympic Games since the Los Angeles Games of 1984. The object of these projects was to scientifically analyze the techniques of athletes during competition, discover the secrets of superior sports performance, and pass on these data for future use. It was also hoped that these results would contribute to providing an environment where athletes can perform to the best of their ability, and at the same time protect the athletes from injury.

The ‘Sports Science Education’ project was introduced at the Nagano Olympic Games as a part of this project. Twenty-eight exhibition panels and five videotapes covering a variety of topics were prepared. These panels and videotapes were exhibited at the competition venues and at elementary and junior high schools in Nagano City. Many school pupils, students, and citizens of Nagano viewed the panels and videos.

This project was implemented at the Nagano Games for the first time in Olympic history. The aim of the project was to familiarize the general public with the latest sport science research information and to contribute to the social awareness by disseminating information of Olympic sports on the occasion of the Olympic Games. Experts from the various research fields in Japan contributed to the development of the videos and the display panels. Mr. K. Iizuka of the Japanese Forum of Winter Sports Sciences edited the videos, and the panels were edited by the organizing committee of the project with support from elementary school teachers. The following topics were selected for the videos and display panels which school children and the general public viewed.

1) Video: Videos were prepared covering the following five topics:
   - The Science of Ski Jumping.
   - The Science of Bobsleigh and Luge.
   - The Science of Alpine skiing.
   - The Science of Speed Skating / Snowboarding / Biathlon.

2) Display panels: Display panels covered the following 28 themes:
   (1) Why the V-shape jump gives more distance in ski jumping?
   (2) What is the triple axle jump?
   (3) Skating technique giving speeds of 60 km/h.
   (4) Let’s increase our enjoyment of Short Track Speed Skating!
   (5) The effect of the “Rocket Start” on the bobsleigh event.
   (6) Alpine skiing and the reason for the recent spate of knee injuries.
   (7) Sports for the young.
   (8) What is doping?
   (9) Nutritional supplements for athletes.
   (10) Endurance training at altitude.
   (11) The effects of walking through snow.
   (12) Muscle mass increases with exercise.
   (13) The limits of power.
   (14) Skilled movement begins in the brain.
   (15) Why warming up is necessary.
   (16) Mental training.
   (17) The timing system for alpine skiing.
   (18) The timing system for Nordic events.
(19) The timing system for speed skating and short track speed skating.
(20) The timing system for bobsleigh and luge.
(21) The history of ski/skate sportswear.
(22) Muscle formation in athletes.
(23) What is “aerobic” exercise?
(24) Children and play.
(25) Why the “magic shoe” slap skates give more speed.
(26) All about the wheelchair marathon.
(27) How are amputees able to ski?
(28) Sports and air resistance.

Location and duration of exhibitions:

1) Video

- Aqua Wing (Ice Hockey Stadium B) The duration of the Games
- Nagano City Hall The duration of the Games
- Joto Elementary School (Nagano City) February 6-10
- Yanagimachi Junior High School (Nagano City) February 18-21
- Shinshu University Elementary School February 10-13
- Shinshu University Junior High School February 13-18

* Videos were distributed to state elementary schools (406) and junior high schools (196) in the Nagano region.

2) Display panels.

Two sets of panels prepared for each topic. One set was exhibited at competition venues during the Games, and the other was circulated among several schools in Nagano City.

Feedback from schoolchildren was obtained by means of questionnaires.

- M-Wave The duration of the events
- Joto Elementary School February 6-10
- Yanagimachi Junior High School February 18-21
- Shinshu University Elementary School February 10-13
- Shinshu University Junior High School February 13-18

EXAMPLE OF THE PANEL WHICH DEMONSTRATES ‘SPORTS SCIENCE EDUCATION’

Figure 2 shows one of the exhibition panels in the ‘M-Wave’ arena for speed skating. The author will select one of the panels and briefly provide additional comments.
Figure 2: The Scenery of Demonstrated Panels in M-wave (Speed Skate) Arena in Nagano City

The title of this panel is “How Ski-jumpers Get Longer Distance: The secret of V-style” by K. Watanabe (Hiroshima University) (Figure 3). A summary of the panel in English is indicated as follows:

In the Nagano Olympic Games, most of the jumpers will adopt the V-style of jumping. The merit of the V-style jumping has been studied by using the wind tunnel. The upward force of the lift component, which makes jumpers rise against the force of gravity, was greater in the V-style of jumping than in the traditional style.

Additional information, described in Japanese, is presented in the panel. The following points are described:

1) Brief history of the V-style jumping.
2) Why birds and airplanes can fly in the air?
3) Why jumpers get a longer distance using the V-style?
4) The mechanism of the wind tunnel
   1. Total system of wind tunnel
   2. What will be measured by wind tunnel.
   3. Let’s watch the stream of air.
   4. Measurement of V-style in the wind tunnel
Figure 3: The Example of the Panel ("How Ski-Jumpers Get Longer Distance: The Secret" by K. Watanabe)

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SUMMARY AND DISCUSSION

1) Impression of the panels

The questionnaire was given to the adults who attended the arena and to the children who observed the panel in the schools (Watanabe & Zhang, 2000).

Students in elementary school grades 4-6 and in junior high school grades 1-3 evaluated the panels. Most of them responded favorably to the panels, indicating they were interesting and easy to understand. The more interesting results from children was that they “understood the importance of the relationship between sports and sciences”. The importance attributed to giving children the most advanced and latest knowledge of sport sciences was particularly gratifying.

2) Video demonstration

The videos were also demonstrated in schools as well as other locations. Since the videos required more time than the panels to understand the various topics, it was difficult to evaluate the results using a questionnaire.

However, the following point about the sports science education videos should be mentioned. The one topic of the video, entitled “The science of ski jumping”, has been translated into English and also into Chinese from the original Japanese version. The English version was introduced to the IOC Medical Commission in Nagano and had strong support.

3) The present challenge of ‘Sports Science Education’ of the IOC Medical Commission is one of the trials of action in the field of physical education and sport.

Furthering ‘Sports Science Education’ should continue in the future as new trials are conducted. The procedure for developing educational materials and introducing them into schools for teachers and children to view is illustrated in Figure 4:

* Figure 4: The Process for Developing the Educational Materials

- Principle and purpose of Sports Science Education.

- Developing Sports Science Information (Experimental studies etc.)

- Processing the Sports Science Information for easy to understand.

- Introduce the Sports Science Information to Teachers and Children.

- Check the Impression and Quality of the Information by the teachers and children.

- Check the effectiveness or efficiency of the Sport Science Information.
REFERENCES


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Physical Education Teacher Preparation in Singapore: Past History, Present Realities, Future Challenges

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Abstract

Significant changes in emphasis, programmes and curriculum have taken place over the past 15 years in Singapore, more than at any other point in time in Singapore’s history of physical education teacher preparation. Physical education teacher preparation in the early 1920’s consisted of some form of “physical training” and was only provided for male trainee teachers. From the Teachers’ Training College to the birth of the Institute of Education in 1973, physical education teacher preparation has evolved and by 1973, PE became a major pedagogical subject that a student teacher could offer alongside a second classroom teaching subject. The emphasis then was very much on practical and pedagogical skills. The setting up of the College of Physical Education in 1984 was the turning point in which physical education was studied as an academic, as well as pedagogical subject in a Diploma in Physical Education program. The historical point for physical education in Singapore must be 1991 when a degree in Physical Education was offered for teacher preparation for the first time. Since then, tremendous strides have been made and post-graduate degrees are now part of the offerings of the School of Physical Education, which is part of the National Institute of Education, Nanyang Technological University.

This presentation will trace the history of PE teacher preparation in pre and post independent Singapore and attempt to provide insights into why and how physical education teacher preparation has changed in emphasis, curriculum, and approach. Besides presenting the current status of physical education teacher preparation in Singapore, this presentation also hopes to stimulate discussions about future challenges that professionals in physical education teacher preparation face. In this millennium of the high-tech and digital global world, physical education teacher preparation programs must produce that special physical education teacher whose role of educating our youth about purposeful physical activity and health and wellness has become more important.

INTRODUCTION

People are Singapore’s only raw resource. As such, each individual child in Singapore is nurtured and provided opportunities for learning and development within an educational system that has received accolades from around the world.

Although there was formal and informal provision for the training of physical education teachers since 1920, specialist teacher training in physical education (leading to a Diploma
in Physical Education certification) did not happen until 1984. Even then, the driving force behind the move was not so much based on physical education objectives; it was driven more by a national defense consideration – the need to ensure that there were PE specialist teachers for the schools so that male students who leave the education system are physically trained and fit when drafted for mandatory military national service.

The purpose of this paper is three-fold:

1. To sketch a brief overview of the history of physical education teacher preparation in Singapore against the backdrop of the early years of nation-building.

2. To present current physical education teacher preparation programmes in Singapore and discuss what the author understands as current realities underpinning teacher education in physical education in Singapore.

3. To generate a discussion of the future challenges that professionals in the area of physical education teacher preparation face in formulating a coherent, relevant and effective teacher education program that would educate and prepare effective physical education teachers for the high-tech 21st century.

**History of Teacher Education Preparation in Physical Education in Singapore**

To understand teacher education in Singapore necessitates one to have some understanding of the provision of education during the early pre and post independent years of Singapore’s history as a nation.

After Stamford Raffles negotiated and “acquired” Singapore as a trading port for the British Colony in 1819, an Education Department for the Straits Settlement was set up only in 1872. Much of the earlier efforts in providing education prior to 1872 were thus mainly efforts of Christian missionaries and communal enterprise of the people. By the 1900s, education was provided for children of the mainly migrant settlers along racial and language lines (Doraisamy, 1969). Education in English schools were provided by the British colonial masters and Christian missionaries, while Malay schools received support from the British who felt obliged to do so. Most Chinese migrants in their respective clans (associations generally defined by the dialect group) pooled together to start and support Chinese speaking schools that were staffed by teachers brought in from China (Lee, 1987). The Indian migrants were a little slower but they too started Tamil schools, albeit without much success. The English and vernacular schools thus have their own curriculum and the training and education of teachers were left very much to each group who depended upon the “motherland” of their birth to provide the teachers.

Physical education in the English and vernacular schools was generally conceived of and provided for as “physical training” in the early 1900s. The Chinese schools adopted “tichao” and “tiyu” while the British-managed schools followed the military drills and “Swedish gymnastics” movement sweeping across Europe. In almost all the schools (with the exception of girls’ schools started by missionaries) only male teachers taught these PE lessons. More often than not, these male PE teachers were not trained but perceived to be capable of teaching drills and exercises. Informal and ad-hoc training in the teaching of physical education was only initiated in 1920 by J. W. Jefferson, an American employed
by the YMCA who later became the Superintendent of Physical Education for the Straits Settlements.

The post-war years after 1945 was a period of survival and transition. Although there were two teachers' training colleges in the Straits Settlement, formal provision for teacher education in Singapore itself began in 1950 with the setting up of the first Teachers Training College (TTC). Besides their training in teaching classroom academic subjects, all trainees at the TTC had to undergo a 30-hour introductory course in physical education conducted during school holidays. Trainees in the 3-year (part-time) certificate course could elect for another 30 hours and 90 hours of physical education in the 2nd and 3rd years of their training respectively. The physical education training curriculum was predominantly pedagogical and practical in nature (TTC Annual Report, 1951 – 1971). Throughout the 1950s, the PE department at TTC was staffed by local English speaking instructors who were sent to England for diploma courses in PE.

Singapore gained independence from the British in 1959 and the years immediately thereafter were turbulent and uncertain. The 1960s saw the urgency of mass education provision for a nation trying to stand on its own feet. In 1973 the TTC made way for a tertiary Institute of Education (IE) which offered 2 different courses: the Diploma in Education for graduates and the Certificate in Education for “A” level graduates. The compulsory 30-hour PE course was still required of all IE trainees. From 1973 to 1976, trainees in the Certificate in Education program could choose to specialise in a 450-hour PE specialisation program. This particular program was scrapped after 1976. Thereafter, students who opted to train for the teaching of PE had to offer a second teaching subject and received only 180 hours in physical education, besides the compulsory 30 hour PE. Like the TTC, the curriculum at IE for training PE teachers was focussed on practical and related pedagogical content. In-service training in PE was provided in 1975 with the introduction of the two year part-time 135-hour “Advanced Certificate”. In 1977, in response to the Ministry of Education’s need, the IE mounted a 300-hour PE course to retrain surplus Chinese Language and technical teachers into PE teachers.

Although physical education was gaining recognition as a university discipline across North America and England from the 1960s, physical education and sport sciences were never considered as subjects that have legitimacy as academic disciplines to merit a certification on its own in Singapore until 1984.

A historic moment in the history of teacher education in physical education must be in 1984 with the establishment of the College of PE (CPE). The push for a separate institution for physical education teacher training started as early as 1960 but it took almost 24 years before CPE offered the first ever Diploma in Physical Education in Singapore. The final impetus for establishing the college was, for all intent and purpose, because of linked concerns: the increasing obesity rate among school age children, especially boys, and the low physical fitness status of males reporting for mandatory military national service upon leaving the educational system. Hence for the first time in Singapore’s tertiary education, the academic disciplines of sports science, sport studies and sport pedagogy were offered, albeit only introductory courses at a diploma level, alongside the usual practical and pedagogical courses in the 2 years full-time course that was focussed on training PE specialists for junior colleges and secondary schools.

Although established as an autonomous college, CPE was still intricately linked to the IE as all CPE trainee teachers were sponsored by the Ministry of Education (MOE). The CPE’s Diploma in PE program still saw trainee teachers who were required to be trained to
teach a second teaching subject. Of the 1,890 hours spread over a 2 years full-time period, 440 hours were devoted to the academic subjects of PE, sports science and sports studies, 650 hours for practical and pedagogical content of PE while 380 hours were spent on 2 different stints of teaching practice in the schools. The remaining 420 hours were spent at IE on learning the content and pedagogy of the second classroom teaching subject (IE prospectus, 1985 – 1990). Besides the 2 years full-time program, a 1-year full-time in-service Diploma in PE was also mounted for serving teachers with extensive experience in teaching PE at the schools. Short, stand-alone in-service courses (e.g., sport secretary course) were also offered to teachers looking to up-grade their skills and knowledge.

Present Realities

The history of the CPE was a short one due to an unexpected development. In 1990, the Singapore government decided that a second university was necessary to address the limited access to the only university then (the National University of Singapore). In 1991, the CPE and IE were merged to form the National Institute of Education (NIE) which in turn, became an institute of the newly created Nanyang Technological University (which prior to 1991 was known as the Nanyang Technological Institute).

Under the newly constituted NIE, the CPE gave way to a new School of Physical Education (SPE), alongside 3 other schools of NIE. This name change was more than mere cosmetics: for the first time in the history of physical education and sports in Singapore, an undergraduate degree (with Honours), a post-graduate diploma in PE and graduate research higher degrees were offered. The study and research of physical education and sports sciences has, for the first time, found legitimacy as university disciplines in Singapore. Currently, SPE offers the following programs:

a) Diploma in PE – 2 academic years full-time
b) In-service Diploma in PE – 1 academic year full-time
c) Postgraduate Diploma in PE – 2 academic years full-time
d) Bachelor of Arts with Dip. in PE – 4 academic years full-time
e) Bachelor of Science with Dip. in PE – 4 academic years full-time
f) BA/BSc (Honours) – 4 +1 academic years full-time
g) MSc in Exercise & Sports Science - Course work & thesis, part-time
h) MA/MSc/PhD by Research - full-time & part-time
i) In-service courses (e.g., PE Departmental management; sport secretary etc.)

Although the status of PE & sports sciences has broken new grounds in Singapore, there are numerous realities that bound its progress. The NIE is the only teacher training institution in Singapore and most, if not all, its full-time initial teacher trainees are sponsored by the Ministry of Education (MOE). These trainee students received monthly stipends or salaries from the MOE and are bonded to serve upon graduation, limiting those who would like to continue on in graduate studies. It is thus ironical that foreign students make up a greater number of the graduate students by research currently registered at SPE. To address this issue, the school started the part-time Master of Science (Exercise & Sports Science) by coursework and thesis to enable locals to pursue a graduate programme during the evenings.
The intake of full-time undergraduate & diploma PE students in each academic year is controlled by the MOE; fee-paying students are not accepted by NIE. The full-time programs offered by SPE, other than the higher degree research programs, are thus oriented towards teacher education and intricately linked to numerous other essential educational and second academic subject components besides physical education (NIE Programme Handbooks, 1991 - 2000). A number of students specialising in physical education thus find themselves having to cope with the demands of studying a second academic subject (Art or Science).

Like all professional teacher educators world wide, the issue of program coherence and relevancy is a constant dilemma. The need to balance academic knowledge-based content with practical and pedagogical contents for physical education teacher training has always been an issue with students and staff. The extent to which professional teacher preparation in physical education needs academic content knowledge versus the clamour for more hours in the practical and pedagogical courses is not an easy issue to resolve. There is the constant question of how much academic content is needed in a physical education teacher education program and whether such academic content meets the needs of the PE teacher in his/her actual teaching roles upon graduation.

Another current reality is that the curriculum for the different full-time initial teacher training programmes in physical education must also fall in-line with the structures of all other NIE initial teacher training programmes and hence much negotiation has to take place across the various schools during curriculum review. As of academic year 2000, the undergraduate degree program at NIE will focus entirely on primary level teaching, effectively removing the route for producing a PE specialist for the secondary route via the 4-years full-time program. The only program that will produce secondary school PE specialist available after July 2000 will be the post-graduate Diploma in Education (Physical education).

Besides pedagogical and practical courses, most of the higher level PE courses in the undergraduate degree and higher degrees by research or coursework are in various specialization tracks (i.e., exercise physiology, biomechanics, sport psychology, sport management etc.). Another reality arising out of this is the difficulty in recruiting academic staff who have both the academic qualifications in a specialized academic area as well as physical education teaching certification.

**Future Challenges**

As can be seen by the current realities faced by SPE, the challenges facing physical education teacher education in Singapore are many. Many different strategies and consultative interactions with other professionals in the field will be needed to find ways of facing and meeting these challenges.

In addition, the fast pace cyber era that we are now moving in, the high-tech digital world may result in sedentary lifestyles that are detrimental to the health and wellness of our present and future generations. Physical education teacher preparation programs must be re-examined to determine how best to meet this challenge of producing effective physical education teachers who are able to capitalize upon the digital world to motivate youngsters who are tech-savvy to actually get out and participate in physical education and physical activities. Physical education teacher education program must determine how to teach physical education teachers the hard and soft skills of using information technology to
complement the physical education curriculum to achieve learning outcomes. The Singapore IT Masterplan for Education initiated in 1997 by the MOE has been a challenge for the SPE where deliberations on how to incorporate, balance and implement IT-related teaching in physical education are still on-going.

REFERENCES


Sport as a Curriculum Innovation in Singapore

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Abstract
An evaluation study of a curriculum innovation in sport specialisation was conducted in a co-educational Singapore school from 1994-1997. This longitudinal design provided scope for a comprehensive analysis of the school, the staff, the pupils and the implementation of the sports programme, known as the 'Sports Class'. This paper sets out to illustrate the extent to which a sport programme, that was designed to produce both academic and sporting success, could flourish in a Singapore secondary school with high academic expectations. The use of various qualitative measures, such as surveys, interviews and non-participant observation enabled data to be triangulated within this part of the inquiry, which added confidence to the interpretation of the subjective data. As well as assessing the programme outcomes against the original goals prescribed by the Principal, this paper discusses some unanticipated effects that made an impact on the school, the coaching staff and the pupils. The study found that the programme had been successful in improving sporting as well as academic success, two of the original programme goals that supported the programme’s initial design. However, during the four-year implementation period, modifications made to the programme’s structure impaired the initial design and thus created concerns about the future success of the initiative.

A special sports programme was implemented in a co-educational secondary school in Singapore to support selected students in achieving sporting excellence. The innovation at Cathedral High School (CHS), named the ‘Sports Class’, was the brainchild of its Principal, who had seen such sport schools in China. The Sports Class Programme (SCP) at CHS represented a curriculum sport model within the subject discipline of physical education and focused on badminton, basketball and table tennis for boys and girls in the four years of their secondary education. In total, 69 pupils were selected to commence the programme in 1994. In spite of vigorous attempts to the contrary, the rigours and cultural demands of the Singapore educational system have continuously marginalised the status of...
school sport. Therefore, in this context, the SCP represented a unique effort to promote sporting excellence whilst still emphasising the pursuit of academic attainment.

During an interview in 1994, the Principal outlined four goals for the SCP:

1. to help the sports players balance their studies and their sport;
2. to maintain and improve the school traditions in sport;
3. to help the country by developing national players; and
4. to gain official recognition for the scheme.

SETTING

In the context of Singapore, the SCP is unique for two reasons: that it centres on sport and that it emanates directly from within a school. The stringently controlled educational system, although highly successful in producing examination success, makes the notion of a curriculum innovation, emerging from an individual school, exceptional.

Singapore has always strongly endorsed the notion of academic accreditation as a social imperative. Education is still revered as the “sine qua non” for advancement (Aplin, McNeill, & Saunders, 1997:2) and academic success has been seen as the major, if not the only, priority for students. As there is a perception that succeeding in sport and academic studies are mutually exclusive (Ng, 1996), such a school initiative was significant as it represented a substantial shift in emphasis in favour of sporting achievement. The Singapore government has long addressed the social importance of sport as an ideology for maintaining and improving national health, but it is only recently that it has recognised the full political and economic significance of elite sport, sport champions and medals to the nation (Horton, 2000). The emergence of a sport-specific school programme should therefore have been appropriate, as this young, developing and prosperous country has finally recognised the full social value of sport.

In Singapore, schools are ranked relative to their academic attainment, thus achievement in sport has always been subsumed by academic success (Sia, 1994). Accordingly, Principals and teachers have tended to focus heavily on academic attainment to the detriment of sport (Aplin et al., 1997).

EDUCATIONAL INNOVATION OR CHANGE

As the world of physical education has appeared recently to be in crisis (Evans, 1986; Evans & Davies, 1996; Kirk, 1996), alternative solutions have to be found and innovation and change are seen to be necessary. In a study of 58 effective schools in Singapore (Gopinathan et al., 1993), no major curriculum innovation was described that involved either sport or physical education. When considering the SCP as “new or original practice” one cannot automatically assume that genuine change actually occurred and it should be viewed as a process rather than a product (Kirk, 1988:83). Sparkes (1991a:1) distinguished between “real and superficial” change and suggested that many modifications were superficial, but nevertheless, the innovation gained legitimacy. The centrality of the innovator (in SCP’s case: the Principal) is critical for the process of effective change. The significance of a Principal’s philosophy, influence and understanding of management has been found to be a key factor in the development and maintenance of ‘excellent’ schools.
Sports as a Curriculum Innovation in Singapore

(Beare, Caldwell, & Millikan, 1989; Block, 1983; Blumberg & Greenfield, 1986) as well as in the “management of change” (Sparkes, 1991a:7).

METHODOLOGY

In this study an “ecological” approach (Sparkes, 1991a:7), which looked at the major actors in relation to their natural working environment (Underwood, 1988), was adopted. The nature of the research setting and the topic suggested that a uni-dimensional research paradigm would be not only “unwise” (Pieron, 1997:53) but would provide only part of the story (Gerber, 1994; Silverman & Ennis, 1996). A multi-dimensional research methodology using “multiple criteria” as recommended by Posavac and Carey (1997:84) was thus adopted. This was viewed to be able to reduce the likelihood of a single variable distorting the analysis and better reflected the complete picture. A combined qualitative/quantitative model that would add the necessary confidence to the interpretation of the subjective data (Caracelli & Greene, 1993; Lincoln & Guba, 1985; Silverman & Ennis, 1996) was embraced in this four-year longitudinal inquiry to enable triangulation of the data.

The SCP was evaluated from 1994-1997 using an experimental/control group design, which provided scope for a comprehensive analysis of the school, the staff, the pupils as well as the process of implementation. Established inventories, non-participant observations, plus surveys and interviews with the Principal, physical education teachers, coaching staff, and subject teachers provided the qualitative data.

An improvement-focused evaluation model (Posavac & Carey, 1997) was therefore selected for this project as it best monitored and articulated the process of innovation, allowing judgements to be made about the programme’s outcomes. As the programme unfolded, frequent observations, measurements and reflections were made using an “inductive-deductive approach” (Cohen & Manion, 1985:4). These were used in the annual reports that assisted ongoing policy making decisions with regard to the programme’s development.

RATIONALE

This study provided a comprehensive analysis that reflected the status of school sport in this unique initiative in a South East Asian setting. In consideration of Singapore culture, the study assessed the impact of an elite-sport model on academic attainment and at the same time highlighted the success that the model brought to the school’s sporting achievements. The impact of the programme was gleaned from the opinions of its major participants, the sports players, the coaching staff, and the Principal. The model’s contribution to junior sporting excellence was considered from an evaluation of the initiative’s potential as a legitimate flagship for the advancement of sporting achievement in a Singapore school programme.

The timing of this innovation was significant as sport was further losing status to academics in the school curriculum while the government was stressing the importance of elite sport to the future identity of the nation. As there has been a paucity of field research conducted on physical education and sport in Singapore schools, it was important to ascertain whether academic attainment would be impaired by intensive involvement in
sport. A successful profile of the programme’s achievements would strengthen its case for legitimisation as another ‘gifted’ programme in the Singapore educational system.

**THE MANAGEMENT AND CULTURE OF INNOVATION**

Johnson and Scholes (1989) defined two management models, which can be readily applied to the school environment: (1) where the dominant strategy is conservative, safe and focused on traditional solutions and (2) where the management is more concerned with innovation and breaking new ground.

The beliefs underpinning these structures are also very different, with the more stable, conservative model having as its priority the securing, maintenance and improvement of its niche within the market, whereas the more volatile, innovative model has a greater potential but an unproven record. There are therefore greater risks attached to innovative practice, which may result in additional pressure and tension in securing positive development. The educational system in Singapore could have been described previously as more closely aligned with the conservative model, however, recent measures are directly aimed at breaking new ground for a ‘knowledge’ economy.

**THE SCHOOL CULTURE**

In educational terms, Ubben and Hughes (1987:17) suggested that school culture refers to its “effectiveness” in producing excellence, which, when translated into Cathedral’s policy, can be interpreted as academic and sporting success in the name of an ‘all round education’. Therefore, as sport took on a more central role in the life of the “SCP”, its culture, rituals and practices attracted more meaning, had greater social significance and gradually influenced the wider school culture. Almond (1996:190) referred to these elements as “cultural practices of significance” identifying them as a significant part of human heritage and cultural life. This was important because the programme had previously created some animosity amongst the staff and students alike. Once sport became accepted and the innovation had been established the process became legitimised, internally at least. The political climate towards the national importance of sport in Singapore is changing with greater significance being given to its role of improving the nation’s international status; the government also offers a range of financial incentives for citizens to recreate. Although this will take time to impact, eventually competitive sport will become an integral part of the culture.

Chinese values dominate the school culture at CHS and this is evident in the language and behaviour of the coaches. The Chinese language teacher displayed the complex nature of culture, as he transferred moral issues underpinning Chinese culture from his language classes to sport. The sports of badminton, basketball and table tennis, which are mistakenly assumed to be Chinese in nature⁷, perfectly reflected the mission and traditions of Cathedral High School. The players’ perception of coaches from China and the reaction of some girls to the Chinese language teacher suggested that ethic bonds are diffuse, awkward and even outdated in terms of the current values of modern Singapore youth.

Horton (2000) identified a cultural imperialism in Singapore that ran parallel to that of the British, that being the Chinese. Today the cultural influence of the Chinese is predominant in Singapore. This was evident in the SCP model where traditional Chinese values were being promoted through sport being taught in Chinese. In physical education classes.
teachers utilised a typically Chinese structure for preparing pupils for fitness training. This warm-up model was calisthenic in nature and conducted in lines, with prescribed actions that pupils recanted to Chinese numerals (1-8): yi er san si wu qi ba.

SCP AS AN INNOVATION

Fullan (1982:51) stated that “the political and symbolic value of adoption for schools is often of greater significance than the educational merit” and the symbolic value was important as it could set the preconditions for real change in practice. The SCP model represented the first prototype for sports specialisation within Singapore schools. Its significance lay in the fact that the curriculum ‘ice’ had been broken and sports could now be taken more seriously in schools. As “real change” (Sparkes, 1991a:2) involved transformations in the ways that people think and feel, this innovation represented a form of ecological pragmatism and thus could be more appropriately described as superficial. Essentially because, in the SCP model, the teachers were not required to rethink their practice or ideas, but were sanctioned to focus purely on the role of preparing teams for competition, the programme could be viewed as a ‘managerial’ rather than an ‘educational’ innovation. One advantage for the school was the fact that this change was not externally, but rather internally imposed, because of the Principal’s deeply held beliefs that regarded the value of sport as an important aspect of an “all-round education”. All sports’ players gained directly from the programme’s implementation, as the needs and desires of the players, as well as the coaches, appeared to be well supported by the CHS administration. The main burden of the implementation was ensuring the long-term cooperation of the academic staff to maintain their loyalty through remedial and academic support.

As innovations were rarely neutral, Sparkes (1991b:20) suggested there were “winners, losers and those on the sidelines.” For teachers, as crucial players in the process, the SCP represented a real change to their ecology: for some this was positive, whilst others were negatively affected. The key player was the Principal, however the physical education teachers and coaches played a major part, whilst academic teachers in the school were on the sidelines of the programme. Some of the academic staff were spiritually behind the initiative, others had reservations about it, whilst there were those who were luke-warm or even negative in their response. A comment recorded during the first year of the programme demonstrates the level of negativity that existed among the staff:

some of the staff feel that the students are being pushed a bit too much, especially those students who are weak. If the students are very capable then there does not seem to be any problem. I also think that some of the staff feel that they receive too many privileges, particularly when it comes to exams. Their exams are postponed and we have to set a different paper altogether, just for the sports classes. It is a lot of work setting a new paper and marking this paper having finished the others, just for some 20 or so students.

The member of staff went on to suggest that while the SCP was creating an awareness of the school, there was a fear that the programme would attract an unruly element that would negatively impact on the school’s reputation, itself a cultural indictment of sports people. This was because twelve pupils that the Principal had introduced into the SCP did not have sufficient PSLE points to enter the school legitimately. If this opinion was representative, it appeared that the academic subject teachers had missed the whole point of the programme.
Sparkes (1991b:21) mentioned the “loss, anxiety and struggle” of participants in an innovation and tensions were created in the school for staff and pupils alike by the implementation of the SCP. Some of this tension generated positive reactions and some of it created a sense of antipathy amongst teachers who frequently excluded the sports players from a selection of the inter-class competitions. Neither were the SCP pupils themselves blameless in this process, as they often showed reluctance to participate in these activities. Initially non-sports (NSC) pupils were also sidelined by the apparent inequity of the programme design and appeared to be jealous of the publicity, treatment and privileges bestowed on their ‘arrogant and pompous’ peers. This was a popular description of the SCP players, drawn from both an NSC questionnaire in 1995 and also extracted directly from the SCP players interviews later on. Clearly, this description identified a degree of mismanagement in the promotion of the programme.

In ecological terms, the innovation was supporting the continuity of a school tradition and values that had been held important by the Principal and by the school since its inception. The physical education staff had everything to gain from doing professionally what they wanted to do most and were obviously supportive of this initiative. The SCP dominated their working lives and physical education, paradoxically, for which they also had accountability, was peripheral and less important. Murdoch (1990:63) discussed this perceived “interface” between physical education and sport and recognised that the marginalisation of physical education was a negative consequence of sport development in certain polarised conditions, which she referred to as the ‘versus’ or ‘substitution’ models. Murdoch (1990:71) advocated an ‘integration’ model to “meet the challenge of providing for the needs of each child.” At CHS there ought to be a more equitable provision for physical education, one that not only integrates sport and physical education but also reinforces it. This interpretation may reflect some cultural bias, however, as the Singapore model for physical education heavily revolves around fitness, some shift in mindset will be necessary to integrate the two phenomena. Perhaps elite sport and physical education should remain quite discreet as combining them can produce confusion, mistrust and bias, but the problem remains that while many pupils involved in elite sport are denied a physical education, physical education itself lacks appropriate relevance for the remainder (Grant, 1992). Elite sport became the champion at CHS and physical education was relegated as a low priority in the day-to-day lives of the staff and the pupils.

In the context of a meaningful sport culture, Sparkes (1991b:24) discussed two conflicting perspectives, the ‘sporting’ and the ‘idealistic’. The former was elitist, traditional, meritocratic, subject-centred and concerned with the maintenance of standards and outcomes. The latter was more egalitarian, child-centred, progressive and concerned with personal and social development and judged on educational criteria. The SCP experiment had, from observation, characteristics of the former, as it tended to utilise an elitist strategy, which relied on the visible and public display of sporting excellence via the production of successful teams.

The implementation of this innovation generated media publicity that produced kudos for the Principal, the coaches and the players, but caused discontent amongst those outside the sports programme. The status of sport (winning teams) became powerful and important within the school as a result and this was passed down to the teachers, coaches and the SCP players as extra pressure to succeed. However, physical education lost status and there was evidence of unsupervised pupils in physical education classes playing haphazardly amongst themselves. Reinforcing Grant’s (1992) opinion, it was not uncommon to see fully clad girls sitting sheltered in the shade, while boys also in uniform
were kicking soccer balls or shooting basketballs. One trainee teacher on teaching practice commented that:

The PE Department is rather disorganised, to be honest. There is no scheme of work for the whole school. The policy of giving each class a basket of three basketballs, one football and one volleyball for their lesson speaks for itself. Occasionally the teaching of some field events like javelin and discus was carried out, but not with any regularity. More could be done by the various PE teachers, if only they were not so tied up with their respective school sports teams. Having a proper scheme of work, dividing the equipment and areas among the classes would certainly benefit the teachers by reducing confusion.

Alienation is an accompanying consequence of innovation and this became apparent not only with those players who were dropped from the programme, but also with the NSC pupils and even some of the academic staff. SCP publicity generated some resentment amongst NSC pupils and the Principal, who would regularly praise the SCP players in school assemblies, a practice that would appear to be appropriate and even quite normal, unintentionally reinforced this. In a questionnaire (1995), almost three-quarters (72%) thought that the SCP players had access to better facilities and better equipment and a similar amount (75%) also believed that the SCP pupils received more privileges as well as more personal attention in sport and physical activity.

Some actions of the academic staff also appeared to ostracise the SCP pupils, as they failed to comply with the practice of not setting tests during tournament periods. This was reported by the table tennis coach and also by some of the players, but was a major issue for the basketball coach, as he considered that the tests were interfering with his players’ motivation and concentration during important matches. To a limited extent there was a feeling of alienation by the SCP players themselves as evidence from the interviews indicated that they, as a special population, felt marginally isolated from the rest of the school. A female basketball player (interviewee: 59) interpreted a fairly common sentiment thus:

The teachers do not particularly like our sports class; because of tournaments we tend to miss the class a lot. Then it will disrupt the class and the teachers don’t like it because the lessons are all scheduled and she has to change it. Other classes think that the sports classes are having a lot of privileges, but we aren’t at all. We miss a lot and they think that the school seems to be very biased on our side. So they don’t like us.

Some teachers were becoming more disenchanted with the reality of the innovation, as it created an additional burden for them. Over the four-year period of analysis, the programme’s impact waned to the point where teachers were not only failing to support the SCP pupils in their tests but were not delivering remedial assistance and support as originally promised. Both Alexander (1996) and Almond (1997) illustrated that this was a common factor in curriculum innovation and that it required pro-active rather than reactive measures. This was corroborated by the coaches of all three sports and by some of the players and altogether, represented a constraint to the overall development of the innovation. As Sparks (1991a:15) suggested, change is not sustained by the mere introduction of a curriculum package. There is also a continual need to “recycle” and regenerate (Raymond, 1991:47), highlighting the need for external support to come in early to bolster the impetus of the innovation. The SCP lacked external assistance and thus, was not allowed to develop fully. To safeguard the school mission, the Principal retreated to safe ground, modified the SCP structure and appointed a ‘Coordinator-in-charge’. At
the inception of the SCP, energies from all quarters were high, but with no tangible support coming, teachers and coaches began to question its value as the programme brought so many extra demands.

PROGRAMME IMPLEMENTATION

An innovation has many phases and, as part of its lifecycle, changes have to be implemented to ensure that its design meets the original objectives. Fine-tuning was continuous over the duration of the study and resulted in three major structural changes to the programme, all of which had an academic bias. The first modification occurred at the end of Secondary 1, when the early morning sport periods were changed to become the last three in the session. This was an outcome of the resultant fatigue from the early morning training and consequent academic staff comments on the players’ lethargy in the late morning periods, when apparently they were unable to concentrate.

A further modification occurred in January 1997, when the Principal reduced the size of the programme from two classes to one. This change was due to his concern about the emotional turbulence at the end of Secondary 3, when some of the SCP pupils found out that they had been dropped from the programme because they were not team players. The Principal was also influenced by the reaction of parents, when these pupils were withdrawn at such a late stage in their secondary education but, at the same time, he was concerned about the school’s academic status. He had succumbed to the pressure of school ranking. This was the most significant modification to the SCP model; it created additional pressure for the coaches and placed even more emphasis on an accurate selection procedure. This change had a major effect on this particular cohort, as half of them were excluded from the SCP after three years of making sacrifices for the school. The Principal believed that with only one class instead of two there would be no disappointment, as everyone in the new SCP structure would be retained, whether they were team players or otherwise and therefore the problem would not exist.

The final change, effected by the Principal, was the removal of sport periods from the timetable of the SCP pupils in Secondary 3 and 4. He felt that the players already had enough sport in their lives and that they needed to focus on their academic studies as it was approaching their “O” level examinations. This measure directly brought about an increase in the number of after-school training sessions and a major loss of status and privilege to the SCP pupils as they now had to train during out of school hours.

In December 1997, a computer error produced an anomaly that deprived the Principal of some prospective primary pupils that he was intending to introduce to strengthen the SCP. These sports pupils, without the required number of Primary School Leaving Examination (PSLE) points that had selected Cathedral as their secondary school, were ignored, leaving the Principal with essentially “Special” stream pupils. The Principal declared how difficult it was becoming to keep the SCP project running without select talent being posted to his school. This seriously hampered his plan to maintain and develop a sporting elite at CHS, as he was unable to attract pupils with a genuine sporting ability to the school. Attracting talented sporting pupils was made more difficult when the number of PSLE points, necessary for entry to CHS, rose to 250 in 1997, a big increase on the 1994 level of 238. As the school becomes more academically selective it would appear that there are fewer pupils interested and available for sport specialisation. This would seem to contradict the findings of Almond and McGeorge (1998), where they showed there was found to be a
strong association between sporting success and academic ability. In Singapore, parents clearly have not modified their 'academic' mindset.

**MONITORING AND FINE-TUNING THE MODEL**

Out of the 69 pupils originally selected for the SCP, 37 remained in Secondary 4; three players stayed in Secondary 3, while three left CHS altogether. A total of 30 pupils represented the school team in their final year, as well as four pupils from another class, who had been dropped from the programme, indicating that almost half achieved their goal of representing the school in their final year.

Thompson (1993) noted that the director, in this case the Principal, as a key administrator was central to the success of the programme and the well being of the athletes. The Principal’s main role was to take care of the academic dimension of the programme, while he delegated the administration, pastoral care, training and preparation to the coaches and an administrator. The Principal played a critical role, as he had to prove to the School Board, the Ministry as well as the parents that the SCP was more successful than the previous system and knew that if the school’s academic ranking fell, he would lose some credibility, given the substantial publicity accorded to the programme. The Principal’s position, however, may have been too aloof for him to produce an accurate insight into the players’ well being, other than making objective judgements based on their academic results. According to one of the coaches, the initial appointment of a programme administrator had not been overly successful because, as a member of the academic staff, he was considered an outsider, with the SCP appearing to be just another administrative duty. The appointment of a programme co-ordinator, in the form of a head coach, with a vested interest in the programme’s outcomes and players’ welfare, would have been more suitable for handling the very important management role within the SCP. An appointment of this nature would have allowed the Principal to make executive but informed decisions based on his own objective criteria without personally having to audit the programme. The SCP players would then have received better counselling and support when it was necessary, rather than being discarded from the programme because their studies were suffering.

The Principal was convinced that all of the changes were necessary and were in the SCP players’ best interests. Ultimately, parents would judge the Principal through the academic success of the school, vis-à-vis the school’s ranking, and not by the ECA success of the SCP programme alone.

**ACADEMIC OUTCOMES OF THE SCP**

One of the original aims of the study was to examine the school’s ranking status over a four-year period to investigate the impact the innovation had on the academic results of the SCP pupils, when compared to the NSC pupils. At CHS, between 1994 and 1997, almost every pupil (99.5%) achieved five ‘O’ Level passes in the annual Cambridge examinations, compared to the national average of 72.2% for the same period and 93% scored high enough to gain admission to a Junior College (JC) (refer to Figure 1). In 1997, the percentage dropped slightly to 99.2%, however, this can be accounted for by an increase of more than 100 pupils being entered for the examinations.
In 1995 and 1996, out of the top 50 schools in Singapore, CHS was ranked 11th academically but this position slipped to 15th in 1997. Although the school recorded a maximum 100% in ‘O’ level passes in 1995, the number of pupils qualifying for Junior College in 1997 was higher than in 1995 by 2 percentage points. The academic standard (refer to Figure 1) was therefore maintained at a very high level and the improvement in pupils qualifying for JC also continued over the period of the study, with only a marginal deterioration in 1997.

These SCP results were compared with the academic results of the NSC pupils in 1997. As can be seen in Table 1 the SCP players achieved better results in all three categories, justifying the academic component in the SCP design. Only one SCP pupil failed to qualify for Junior College, however, this was not one of the 12 pupils admitted to the school in 1994 with lower than the prescribed PSLE points, further vindicating the Principal’s decision to allow these ‘sport’ students into the school. As academic attainment was one of the Principal’s original goals, the SCP can be seen to be operating with distinction.

**Table 1: SCP and NSC Academic Results for 1997**

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<th></th>
<th>NSC</th>
<th>SCP</th>
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<tr>
<td>5 or more ‘O’ level passes</td>
<td>99.2%</td>
<td>100%</td>
</tr>
<tr>
<td>Junior College admission</td>
<td>95.6%</td>
<td>97.3%</td>
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<tr>
<td>L1R5 (Aggregate)</td>
<td>12.5</td>
<td>11.8</td>
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Publicly reflecting on this academic achievement, the Principal stated that “having been through numerous battles, sports students are generally more disciplined. They tackle exams with more confidence because they have a lot of mental strength” (Straits Times, 15th October, 1998). This was backed up by the fact that 97.3% of the sports students gained admission to Junior Colleges compared to 95.6% of regular students. This clearly supports the notion that the sports programme did not adversely affect the academic results of the SCP players.
GENERALISABILITY OF SCP MODEL

The transferability of the SCP programme design for other Singapore schools to follow cannot be determined directly from the data since the school population analysed was far too specific. However, the model can have relevance for other schools, especially those that place a lower priority on academic attainment, providing that there is substantial commitment from the respective Principal and his/her staff, in the knowledge that physical activity can be linked to academic performance. In support of the SCP, sports players (55%) considered it worthy of adoption in other schools, a feature that was favoured more by boys (88%) than girls (36%). However, the ‘sport’ concept would be more successful if sequenced through all three levels of the educational system, which would require an introductory stage at the primary level, an intermediate stage at the secondary level and an advanced stage at the tertiary level. This structure would produce a sports development programme, which could offer some protection against the academic merit system but would acknowledge a pupil’s contribution towards sport, school and country. Pupils, who committed themselves to such a project wholeheartedly, need to be assured that there will be continuity and purpose and that some value and appreciation will be attached to their sacrifices. It is suggested that Singapore needs to have a national “Sports Class System” in place so that ‘sport development’ policies can flourish and achieve elite standards.

LEGITIMISATION

The fourth of the Principal’s major goals was to achieve recognition from the Ministry of Education (MOE) by endorsing the programme as an “elective” for the gifted in sport. This legitimisation would enable him to allocate greater funding and staffing to further develop the project and would also release some of the constraints that were impeding the full implementation of the programme. The uniqueness of the location is perfectly suited for upgrading the model to ‘gifted’ programme status, not just because the SCP is established and operational but more, because it ties in with the national goals for SPEX 2000 (now SPEX21) and is ideally suited for accommodating foreign talent.

At a time when there was considerable rhetoric about sports excellence and schools had been identified as the source for this talent identification, nothing tangible had emerged from the NSA’s or the Ministry of Education. The SCP model stood alone without adequate recognition, which effectively identified the physical domain as inferior to languages, art and music. However, these gifted electives are driven by academic courses leading to ‘O’ and ‘A’ level examinations and this is lacking in Singapore’s physical education curriculum and therefore represents a weakness in the programme’s design and an obvious area for development. The high PSLE entry requirements for CHS is effectively preventing a sporting elite from entering the school as it has the effect of attracting students that have a more conservative and academic disposition. The Principal still hopes to achieve official recognition for the programme. However, if the players had to study an identical curriculum over the same period as other students, it was impossible to achieve this objective. This highlights a necessity to review alternative curricula in the UK, Australia, Europe or Malaysia and clearly represents a major paradigm shift in view of his original expectations of the programme’s goals. The Principal again emphasised that support from the Ministry to upgrade the SCP to ‘elective’ status was essential if the programme’s full potential was to be maximised and in turn this would help enormously to create status for sport in schools.
PROGRAMME OUTCOMES

After four years the programme had only met two of its four main objectives that were designed to help the students excel in both their studies and their games. As part of the innovation process the Principal indicated that he was reconsidering one of his original objectives, which was “to develop some national talent.” He stated that a reconceptualisation of the programme’s goals was necessary because he had received confirmation that it was even more difficult than previously thought to produce a national caliber athlete strictly from a school base. He had formerly thought that the SCP could develop national talent, but he had found that the production of elite sports people was actually very difficult. He realised that, if these sports pupils were denied a separate or modified curriculum, they would not have enough time for all the skill training that is necessary to meet a national standard. The Principal conveyed a perception popular in Singapore, that ‘quantity’ or ‘time’ is the critical variable for sporting excellence rather than the calibre of the athlete or the coach or indeed the values of the family in supporting such an objective. From a research perspective, the SCP players appeared to have adequate training time, so it is most likely that the intake lacked the necessary potential to be national players.

The Principal appeared to be supporting his staff by initially rejecting the suggestion, extracted from the players’ and coaches’ interviews, that the academic teachers were losing their support for the SCP initiative in any way. In fact, he thought that, instead, it was the pupils who were losing motivation. The Principal, however, conceded that maybe it was time to revitalise the enthusiasm of his staff, as he also felt that, after four years, the excitement had deteriorated. Alexander, Taggart and Thorpe (1996) suggested that with Sport Education in Australia, when the funding stopped, the initiative ran out of steam; a parallel to the SCP. When the Principal could tell that there was no support forthcoming, he withdrew to a secure position. He was simultaneously being pressurised to become Superintendent of a cluster of schools, but was resisting this for as long as he could to ensure the continuity and security of his innovation. This cluster arrangement, in fact, could be used to strengthen the SCP by bringing in talent: only if the goal was either specialisation in the national interest or development in the players’ interest. The lack of official recognition was another reason why he believed that the staff might think that they were carrying an additional and unnecessary burden. The recalcitrance displayed by the academic teachers was an obvious consequence of them working to support an initiative for which they had no empathy. Evidently, it was of no professional benefit to them and thus had no merit.

The Principal had much to gain from a successful sports programme. He was, after all, the pioneer of sports specialisation within Singapore’s educational curriculum. Lacking official support, his painstaking efforts to improve the programme’s structure and his continuous monitoring of the players’ academic progress indicated that he had the players’ best interests at heart in difficult circumstances. By ensuring, at the end of the day, that all SCP pupils were academically successful, he delivered not only one of his promises to his ‘clients’ but also one of his programme goals. The main beneficiary of this innovation was undoubtedly the school, as it secured a media limelight and this publicity helped CHS to sparkle in the public eye. However, the innovation also highlighted the Principal, who was recognised for his outstanding achievements and awarded the Public Administration Medal (Silver).
SUMMARY

As a consequence of the SCP, the academic standards of this cohort of sports players were better than those pupils from the NSCs and the sports results were better than those achieved prior to the innovation. An emerging trend can be identified in these sports results, as in the final year of the study, CHS won every zone championship it entered and attained the best results ever in national championships. Although this represented unparalleled success, these results were not emphatic enough for the initiative to be considered as a Programme for Sports Excellence. This was, in part, a consequence of the constraints faced by the Principal, through the reluctance of the Ministry of Education to endorse the programme and was also an outcome of the mediocre calibre of the school intake.

The goal of developing national talent was the driving engine for the whole SCP. The Principal was the force behind the SCP and when he stepped down and appointed a co-ordinator in charge, it seemed as though the initiative would lose momentum. This highlights the need for external support to bolster the impetus of the innovation early on. At the very beginning, energies from all quarters were high, but with no tangible support surfacing, teachers and coaches began to question the programme’s value as it brought so many extra demands.

The Ministry of Education had lost an opportunity to recognise the importance of sport by awarding ‘elective’ status. This was an opportunity missed, as other schools were interested in developing elite sport, but were waiting to see if the programme was to be officially recognised. The Principal was trying to maintain equilibrium between the needs of the SCP players and the overall academic, cultural and social standards of the school. Although sports may be important in the future for Singapore, the MOE has not shown tangible support and has maintained traditional perspectives, to ensure that the academic baby is not discarded. Yet, sport is still perceived as a golden attraction for the future.

As the SCP unfolded, the Principal began to realise that the goal of developing national talent, on a scale that he had previously envisioned possible, was too ambitious. Contrary to the global rationale, where sporting participation and studies go hand in hand (Almond & McGeorge, 1998) sporting excellence was more difficult to achieve in a meritocratic system like Singapore’s, where academic accreditation is valued so highly to the detriment of almost everything else. Although the SCP model had the potential to develop specialised talent in three of the core sports, defined by SPEx 2000, it was never intended that the programme would develop into a national ‘sport school’, such as those found in Malaysia, Indonesia, China or Australia. However, had the initiative been officially recognised as an elective programme within the educational system, more could have been done in marketing and promoting the scheme as a serious attempt at sports excellence through an integrated school and club programme. SPEx 2000, along with its provisions, could have tied in more closely with the innovation at Cathedral High School, allowing opportunities for the school to take better advantage of appropriate and additional expertise, whilst offering sports players greater access and incentives for advancement.

EPILOGUE

Since the end of the four-year longitudinal study a series of consequences have evolved. After several years of analysing sporting results of top school athletes that had transferred
to Junior Colleges (JCs), the Principal had come to the conclusion that JCs needed a similar initiative to the SCP. He found that sports players would effectively give up their sport and thus the chance of becoming a national representative because the academic priority in JCs placed too much pressure on them. This is a popular perception supported by the fact that one third (34%) of the sports players (mainly girls: 56%), indicating, whilst at CHS, that they did not intend to continue with sport at JC's. Yet, more than twice as many boys (62%) as girls (25%) reported that they would. However, one year after leaving CHS, with the exception of one boy, everyone remained involved in sport in their tertiary institutions. Girls' involvement remained stable one year later but by 1999 the percentage of boys participation had dropped slightly to 80%. In 1998, all badminton and table tennis players remained in their sport but only 91% of basketball players did so. One year later only the group of table tennis players intact, with the badminton participation levels slipping to 90% and the basketball players still further to 78%, just more than three quarters of those who had participated in the SCP. Nevertheless, overall participation rates were 89%, which represents a very high continuation level, particularly for the girls (100%) and significantly outweighs their own projections. Although academic pressure was evident in the JC, there was evidence that former SCP pupils were not abandoning sport, however the time available for sport was seriously reduced which considerably affected the students' motivation and therefore sport became a lower priority.

In 1996, pupils' perceptions (55%) about the suitability of the SCP for other schools were mixed. However, by 1999, four out of five (82%) would recommend the SCP for adoption in other schools. The boys were unanimous about this compared to only three out of five girls (58%); interestingly, this proportion was equal across sports. This shows that there was more appreciation of the SCP two years after leaving the school, maybe because of their greater maturity or due to their JC experience, they realised the extent and value of their participation in the SCP. The academic, fitness and sporting evidence supports the SCP concept to such an extent that the decision to cut back the programme has to be questioned. Although the Principal had organised a co-ordinator replacement, he perhaps felt that the responsibility for the programme was too great and reducing it made it more manageable for someone with less power and lower status. Subsequently, no doubt as a consequence of the exceptional success of the SCP, as well as the strong values he held for sport, the Principal became Chairman of the Singapore Schools Sports Council. In this capacity his experience, values and energy will prove invaluable for influencing the development of a more cohesive sports system in the schools.

The addition of two specialist PE teachers in 1998 should help to address the peripheral nature of physical education at CHS, however, the majority of their time is unfortunately spent teaching academic subjects. This effectively minimises the potential impact these specialists have to reduce the gulf between sport and physical education that would bolster the overall culture of sport within the school.

Since girls' basketball was dropped from the programme in 1998, both netball and basketball for girls have began to flourish and a modified SCP concept has been utilised to organise and administer these children in separate and discrete classes to streamline the organisation and minimise the disruption during tournaments. This has helped to diversify and extend the sports culture within the school, breaking down further the barriers between the sports players and the NSC pupils. However, these girls are not considered as part of the SCP. Coupled with the downsizing and modifications made to the SCP design, the past two years have seen championship success falter at CHS to the point that only 17 points were scored in national championships in 1999. This compares less than favourably with the 28 points achieved in the final year of the study and relates more closely with the
success attained before the implementation of the programme. This indicates that the failure to regenerate the initiative, the lack of external support plus the severe modifications to programme design have had implications for the SCP’s level of achievement.

In recognition of the role that it will play in Singapore’s cultural future, sport was accorded its own Ministry in April 2000 and will now be controlled through the Ministry of Community Development and Sport. The Singapore Sports Council (SSC) has also introduced Sports Excellence 21 (SPEX21) to build on and replace the goals of SPEX 2000. Additionally, influenced by the Malaysian Sport Schools and potential they possess to create an international reputation, the SSC has publicly expressed an intention to develop such institutions within the educational framework and guidelines are in the process of being drawn up. Whereas the future of sport in Singapore would appear to be well supported, the SCP has lost momentum and slipped out of the limelight; clearly, the dichotomy between sporting and academic success in the schools of Singapore is, for the moment still an acceptable pre-condition for educational success.

NOTE

1 This is not the school’s true name.
2 The system of ranking is used by the Ministry of Education as a means of monitoring schools and is also utilised by parents as a criterion for selecting their child’s secondary school.
3 Much of the culture that was promoted as a feature of mainland Chinese nationalism had been adapted from the teaching of the American missionaries-cum physical educators of the YMCA (Horton, 2000).
4 The use of lines is a traditional form of control that is quite typical for Singapore schools.
5 Through this process, the purpose of producing teams within the curriculum became legitimised to the detriment of teaching a physical education programme.
6 It should be noted that, by the end of the study, there was only one member of physical education staff still active in the programme, all other coaches came from different departments in the school or from outside agencies, such as the National Sporting Associations.
7 The ‘Special’ stream represents the highest level of achievement in the Primary School Leaving Examinations (PSLE).
8 In order that all schools benefit from good leadership, schools were combined into clusters and an outstanding Principal was placed in charge: Mr Tan was identified as one of these outstanding leaders.
9 Secondary school pupils who qualify attend Junior Colleges after their ‘O’ Levels.

REFERENCES


Organised Sport: Participation and Experiences of Children

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Abstract

The purpose of the present study was to collect data on sport participation as well as on experiences of children in different sport organisations. These data are useful sources to increase the quality of policy and guidance in organised sport, which is tuned to the wishes and experiences of young 'customers'.

For the first part of the study a random sample of 564 children was selected. The questionnaire consisted of closed questions about participation and open questions relating to experiences. In addition, individual in-depth and focus group interviews were carried out.

Results indicated that the most popular sports organisation for children is the sports club, followed by the school sport activities. One fifth of the children do not participate in any of the sport organisations. An inductive data analysis resulted in four major categories: program/activities, guidance, enjoyment, organisational/logistic aspects.

One of the crucial aspects children report is the need for diversity in the sport program. Children indicated that negative experiences regarding guidance are an important reason to drop out. Among other things, it is concluded that despite the different possibilities for sport participation, there is a lack of directed activities towards the least engaged children in sport.

INTRODUCTION

Children take part in organised sports in a number of organisations, such as sports clubs, municipal sports organisations and/or school sport. The purpose of the present study was to collect data on the sport participation as well as on the experiences of children in these sport organisations in Flanders. The data are useful sources to increase the quality of policy and guidance in organised sport, which is tuned to the wishes and experiences of young 'customers'.

In this paper we will describe respectively the participation rate (quantitative part of the research) as well as the experiences in sport (qualitative part of the research) of children between 9-12 years of age. Our own data will be compared with other European studies in a similar age group. Taking into account the problem of analysing the participation rate of different studies, it is not easy to compare data from different countries studies because of
differences in definition of sport (participation) and/or of the selected age group. A second problem is the lack of longitudinal data. Notwithstanding these shortcomings, the participation rate of youngsters can be described and trends can be given. The worldwide study of De Knop, Engström, Skirstad and Weiss (1996) shows there are possibilities to compare.

A second point of interest is the way children experience their sport. In contradiction to a worldwide study on participation (De Knop et al., 1996) this information is rather exceptional. At the same time, attention is drawn to the fact that more insight in the experiences, wishes and expectations of young sport participants will contribute to a better or a more child-centred sport (Brettschneider & Bräutigam, 1990; David, 1999; De Knop & Buisman, 1998).

RESEARCH METHODS

For the first part of the study a random sample of 9-12 year old children was selected using Flemish primary schools as clusters. 564 children (49% boys and 51% girls), from 12 schools, filled in a short questionnaire with three closed questions about their participation. Each of the three closed questions were followed by some open questions relating to their experiences or the reasons for not participating in sport activities.

Table 1: Closed and Open Questions in the Questionnaire

<table>
<thead>
<tr>
<th>Closed questions in questionnaire (data about participation rate)</th>
<th>Open questions in questionnaire (data about experiences and wishes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Do you practice sport at school (outside PE lessons)?”</td>
<td>Yes  “What do you appreciate in school sport and what not?”</td>
</tr>
<tr>
<td></td>
<td>No   “What is the reason you are not participating in school sport?”</td>
</tr>
<tr>
<td>“Have you ever participated in sport organised by the municipality?”</td>
<td>Yes  “What do you appreciate in the sport activities of the municipality and what not?”</td>
</tr>
<tr>
<td></td>
<td>No   “What is the reason you are not participating in sport in the municipality?”</td>
</tr>
<tr>
<td>“Do you practise sport in a club?” or “Have you ever participated in sports clubs?”</td>
<td>Yes  “What do you appreciate in a sports club and what not?”</td>
</tr>
<tr>
<td></td>
<td>No   “What is the reason you are not participating in a sports club (anymore)?”</td>
</tr>
</tbody>
</table>

Based on the results of the survey, a selection was made of children for the second part of the study, using the criteria of non-participation in any of the sport organisations. Nine individual in-depth interviews and two focus group interviews (with six and eight children, respectively) were carried out in order to gather qualitative data about children’s ideas of sport participation. Topics of these interviews were:

168 ICPE 2000 Proceedings
Organised Sport: Participation and Experiences of Children

- reasons why children do not participate in the different kind of sport organisations,
- perceptions of children (without actual experience) of sport organisations,
- if children were in charge, how would they organise sport in school, in the municipality and in the sports club: ideal picture according to (non-participants,
- the organisational structure which is most attractive according to the children.

The processing of the data of the first part of the study was quantitative and qualitative for the second part. For the qualitative part we opted for the 'constant comparative method' from Glaser and Strauss (1967), starting with an open, temporary formulation of the issue. Categories were derived from rough data and by means of an inductive analysis.

**RESEARCH POPULATION**

The questionnaire was used among children of 9-12 years of age (4th, 5th and 6th year of primary school). A random sample was taken, using school classes as clusters. The advantage of cluster samples are saving time and low cost (Bouma & Atkinson, 1996; Hart, Dijk, Goede, Jansen, & Teunissen, 1996). An important factor was that the school is the ideal place to reach all types of children (diversity in socio-economical class, sports-loving, etc.).

564 children filled in the questionnaire, of which 275 boys (48.8%) and 289 girls (51.2%) coming from 12 different schools and regions. The sample of schools was a-select, taking into account the proportion of the different educational networks and differences in size between cities and municipalities. Table 2 gives an overview of the number of children that were included in this part of the study according to age and educational network: community (13%), official (23%), and catholic (64%).

**Table 2: Number of Children Filling in a Questionnaire, According to Age and Educational Network**

<table>
<thead>
<tr>
<th>Age</th>
<th>Community</th>
<th>Official</th>
<th>Catholic</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 year</td>
<td>22</td>
<td>21</td>
<td>48</td>
<td>91 (16%)</td>
</tr>
<tr>
<td>10 year</td>
<td>40</td>
<td>29</td>
<td>119</td>
<td>188 (34%)</td>
</tr>
<tr>
<td>11 year</td>
<td>38</td>
<td>63</td>
<td>132</td>
<td>233 (41%)</td>
</tr>
<tr>
<td>13 year</td>
<td>8</td>
<td>14</td>
<td>30</td>
<td>52 (9%)</td>
</tr>
<tr>
<td>N=108</td>
<td>N=127</td>
<td>N=329</td>
<td></td>
<td>564</td>
</tr>
</tbody>
</table>

To collect data for the second part (interviews) the 'sequential triangulation' was used. This means that a selection of respondents is made based on the previous phase of the research (Creswell, 1994). Based on the profile of the children that filled in the questionnaire, a selection was made for the in-depth interviews and the focus group interviews. Those children who were not active in sport were chosen to be interviewed. Nine individual in-depth interviews and two focus group interviews (in total 14 children) were carried out. During the last group interview no new information was gathered concerning our research theme, which was a sign that we had enough useful data. The total number of girls among the children for the interviews was 19 while we had only 4 boys. The reason for this is that girls are more often than boys non-active in sports.
DATA ON SPORT PARTICIPATION OF CHILDREN IN ORGANISED SPORT

Results (Figure 1) indicated that the most popular organisation for organised youth sport is the sports club (61% of the children is member), followed by school sport activities (56%). The latter kind of activities seems to be attractive for those children who are already active in sport. The number of children engaged in sport activities organised by the municipality is relatively low (31%). 18% of the children does not participate in any of the three sport organisational structures.

*Figure 1: Sport Participation of Children (9-12 yrs.) in Organised Sport*

Those children active in school sport often combine this with sport in one or more sports clubs (22.5%). A rather large amount of children were active in the three types of organisations (16.1%). This indicates that once a child has become involved with a sport organisation, it will be easy to become active in another one. Figure 1 shows that a small portion of the children participate only in municipal sport activities. Usually this participation is combined with other sports opportunities. For children, to find the way to the sports clubs and the school sport seems to be easier than to find the way to the municipal sport activities.

Similar school sport participation rates of children were found in another Flemish study (Coopers & Lybrand, 1997). However, differences occur when compared to data from other countries (De Knop et al., 1998). These international differences in participation rates can be explained by the differences in what is meant by ‘school sport’. Our findings
about participation in sports clubs in the age group 9-12 (61%) confirm data from other Flemish studies (Coopers & Lybrand, 1997; Van Pelt, Van Hove, Carpentier & Van Gils, 1995) and in the international literature (for example Brettscheider & Sack, 1996; SCP, 1995; Winkel & Mummery, 1996).

DATA ON EXPERIENCES OF CHILDREN ACTIVE IN ORGANISED SPORT

The inductive data analysis resulted in four major categories: program/activities, guidance, enjoyment, organisational and logistic aspects. Each of these categories will be discussed in detail, for the three organisations in general and if relevant, for one specific kind of organisation in particular.

Program / Activities

Variation in the program is essential to the age group 9-12. A broad offer is appreciated;

“In our city you have the chance to learn all kinds of sports. (...) During the vacation you are free to choose between 28 sports...” (Arno, 10 yrs.).

In contradiction to the program of the municipality and the schools, sports clubs are usually uni-sport oriented, which means that the choice is limited to one sport. In this case children also expect enough variation and creative play in the activities. The broad program of school sport is an ideal opportunity for children to come in contact with a variety of sports so one can try out and perhaps join a sports club. Competitions and demonstrations are exciting and winning gives fun. Children indicate that competitions are good to compare one’s own skills with others.

“Yes, I like it because you have the opportunity to play against teams you do not know. Without matches you do not realise if you are good or not” (Jorn, 11 yrs.).

The rewards children get after an event, such as drinks, food, medals and gadgets are motivating them. Especially in the sports club, the sideline activities are special events.

“I like everything in soccer. Each two years we go to Germany and they also organise a festival of Christmas and sometimes we go visit the National competition.” (Steven, 11 yrs.)

Guidance

Children indicate that negative experiences regarding guidance are an important reason to drop out. According to the children, someone who guides activities (further referred to as ‘youth sport leader’) has to be kind and show interest in the children as individuals. Sport technical capacities are also regarded as important to be able to explain and to show what to do.

“I am in a horseback riding club. Only I don’t like the teachers. They tell us how we should do it, while they can’t do it correctly themselves.” (Nico, 11 yrs.)

According to the children a good youth sport leader is not severe, not boring, should not become angry. Children record that they participate in sport activities
during their leisure time and thus expect guidance that is less hard than in school. They admit that discipline is necessary but, for example, talking with friends must be possible. Therefore socio-emotional aspects of guidance should not be underestimated.

**Enjoyment**

Being together with friends or making new friends as well as learning/improving are the most important underlying factors of enjoyment. This is also described in the literature (Wankel & Kreisel, 1985).

"I am in a club and I practice athletics for five years. I like it because each time I go, I can run faster and jump further." (Ellen, 10 yrs.)

For children who are active in a martial art the aspect of defense seems to be important.

"I do judo because you can go on the defense when someone wants to hurt you." (Elien, 9 yrs.)

Friends are a crucial motivation to go to a sport organisation for the first time and also for further engagement. But the peer group is not always stimulating. As in schools, children are teasing and jeering at each other. For some children this is a reason for dropping out or even the reason why children do not want to participate in sports.

"No, I will not participate in sport (school sport). Because it is not funny, and if there will be a running competition they will laugh with me when I arrive last." (Bret, 9 yrs.)

**Organisational and logistic aspects**

School sport has the advantage that the timing is ideal for children (and their parents) because it is linked with school hours (i.e., Wednesday afternoons and lunch break). But there are also children who have problems with giving up their free playtime.

"I do netball during lunchtime because I like it and if you show effort you can reach nice results. But what I regret is that I can not talk quietly with my friends, because hurry up, hurry up to the netball." (Purdy, 11 yrs.)

The sports club has the disadvantage that training hours are not always ‘child-friendly’. During the week children do not like the late sessions while during weekends an early morning session makes “sleeping-in” impossible for the children.

An important part of the activities of the municipality are holiday sports camps. Some children indicate that they are happy with this initiative because it gives them something to do. A barrier of municipal sport activities, in contradiction with school sport, is the fact they are confronted with children they do not know. Another point is that children indicate a lack of information about municipal sport activities.

Also children do not like the long waiting time during competitions. This seems to be a problem in some sports in the club and sometimes during school sport competition, for example swimming and athletics.
Children are concerned about all the aspects of their sport engagement, such as the program and activities, guidance, and organisational aspects. Therefore they should be consulted in each new or existing initiative to be sure that what adults organise for children meets the wishes and expectations of the target group. People responsible for the budgeting, planning, organisation and evaluation of youth sport regardless of the context, have the important task to give special attention to the less talented youngsters.

CONCLUSION / DISCUSSION

Participation in organised sport is an important and easily attainable form of cultural expression, which originates in youth and which remains important throughout an individual's life (Vanreusel & Bulcaen, 1992; Smoll & Smith, 1996). Notwithstanding the crucial role of the organisational structures in youth sport, research indicates that once in the puberty, youngsters are dropping out, and are 'shopping around' (Vanreusel et al., 1992). The fact that two-thirds of the time that Flemish youngsters (12-18 yrs.) are sports active is actually spent in non-organised sport activities (Buysse, Van Oost, Laporte, & Musch, 1991) indicates that adolescents find something within an informal sport setting which is apparently not present in organised sport. Therefore, positive experiences during childhood are of importance for the well-being of the individual children/youngsters and for the common good of a healthy society.

One of the crucial aspects children quote is the need of diversity in sport programs, as well in the number of sports and variety within one sport. Most of the data about school sport relates to competition. This is an indication that actual school sport is very competition oriented and thus targeted to those children who are already active in sport. This is also reported by De Knop et al. (1998). The aim of school sport is to offer a broad sports program in the familiar surroundings of the school. School sport organisers have to take into account that all children, also the less talented, should have the opportunity to try out one or more sports.

The youth sport leader has a very important responsibility. Socio-emotional aspects of guidance should not be underestimated. Being together with friends or making new friends as well as learning/improving are the most important underlying factors of enjoyment. On the other hand, harassment among peers is a reason for dropping out. Children are concerned about some organisational aspects such as timing, grouping and about accommodation. Despite the different possibilities for sport participation, there is a lack of activities directed towards the least engaged children in sport.

NOTE

1With school sport is meant extra-curricular sport activities organised within or outside the school accommodation, whether or not coordinated by the umbrella organisation of school sport in Flanders.
2Flanders is the northern, Dutch-speaking part of Belgium with a population of 5.9 million, of which about one million (or 18%) is between 5 and 19 years old (Eurostat, 1996).

REFERENCES


174 ICPE 2000 Proceedings
Asian Martial Arts in Western Physical Education

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Abstract

The Asian martial arts consist of a wide variety of disciplines that can be distinguished by specific characteristics. During the last three decades, they have become increasingly popular in the West. Apart from several classification systems that exist within the martial arts, three different approaches to martial arts practice have been described (i.e., traditional, efficiency, sporting). In recent years, there has been a growing interest in Western-Europe to incorporate the Asian martial arts into the physical education curriculum. To analyse the actual status of Asian martial arts practice at schools in Europe, data were collected through the National Physical Education Associations of a number of Western-European countries. Questions related, among other things, to the types of martial arts and the extent to which they are introduced during physical education classes. Based on the collected data, it can be noticed that martial arts instruction in Western physical education is often limited to the efficiency approach in which the emphasis is put on self-defense. Also, it usually includes only one specific discipline (judo or karate). The present paper argues in favour of a sporting approach of Asian martial arts instruction at school and describes a categorisation of techniques suitable for physical education, which can provide a broad perspective of martial arts practice to pupils.

INTRODUCTION

Today, Asian martial arts (e.g., judo, karate, jiu-jitsu, aikido, kendo, taekwondo, wushu) are popular among youth all over the world. A comparative study on youth sport in 20 countries around the world has indicated that in most countries martial arts are among the most popular extracurricular sports that are practised by youth between 10 and 15 years (De Knop, Engström, Skirstad & Weiss, 1996). This trend is further documented by the results of a comparative study on sport participation in 26 European countries (Clearing House, 1997). Findings indicated that Asian martial arts were among the top 10 most practiced sports in general. With regard to organized sport in particular, they came in second place after soccer and were regarded as one of the most important new trends in sports participation.

According to van Bottenburg (1994), the popularity of the Asian martial arts in the West has resulted from a number of factors, such as the growing economic power and international prestige of Japan and, to a lesser extent, other Eastern-Asian countries. Also, the post war stationing of American and European troops in Japan and South Korea, as well as the emigration of Asians to the United States and Europe have contributed to the spread of Asian martial arts in the West. Others have described the popularity of the Asian
martial arts as a result of a new appreciation for traditional and holistic approaches in culture at large, which is reflected in the fascination for psychic phenomena, astrology, reincarnation, extraterrestrial being, Eastern movement disciplines (e.g., martial arts and yoga), etc. (Harman, 1986).

The purpose of the present paper is to discuss different approaches in Asian martial arts that can be used for instruction in physical education.

Classification of the Martial Arts

It is well-documented that most of the Asian martial arts originated in China (Maliszewski, 1992). The first signs of a structured fighting system date back to the Shang dynasty (1,600-1,066 B.C.) (Li & Du, 1991). During the "Autumn and Spring Period" (770-476 B.C.), martial arts contests were held regularly (Xu, 1991). Through the centuries, these fighting skills became more varied and refined. Gradually this knowledge spread to other parts of Asia, where specific local variations were developed. This resulted in a myriad of other Asian fighting styles, in addition to the existing varied system of Chinese martial arts (Draeger & Smith, 1975). As a result of this great diversity of disciplines and styles of Asian martial arts, several authors have attempted to establish a classification system for the martial arts. A number of criteria have been used to classify martial arts (e.g., physical, functional, cultural, historical, philosophical). Classification based on cultural differences is by far the most popular (Donohue & Taylor, 1994). Often, it is indicated that a distinct difference exists between Eastern and Western martial arts. Examples of the latter include wrestling, boxing and fencing. According to Back and Kim (1979), the difference between Eastern and Western martial arts lies in the fact that, with regard to the former, there is an additional gain in other aspects besides fighting skills, such as the promotion of a nonviolent attitude and artistic enjoyment. However, Donohue and Taylor (1994) have indicated that the popular argument for a dichotomy between Eastern and Western martial arts, in which the former are described as more refined and with a higher cultural aesthetic sense, is historically inaccurate and too predisposed. They argued that: "All fighting is dirty, destructive, and practical. Complex social, historical and economic reasons account for the disparate development of fighting systems between East and West, not the intrinsic moral superiority of Asian culture." (p. 14).

Also, variations over time have altered the characteristics of the Asian martial arts. Due to cultural and situational differences between Eastern and Western societies, the introduction of Asian martial arts in the West has had a distinct influence on their specific characteristics ( Förster, 1986; Fuller, 1988; Guttmann, 1991). As a result, even Asian martial arts that are practiced in the West cannot be characterized by a clear and uniform concept. Three different approaches to Asian martial arts practice in the West have been described: (a) traditional, (b) efficiency, and (c) sporting (Theeboom, De Knop, & Wylleme, 1995).

Traditional Approach. In this approach, participants strive for unity and coordination between internal (e.g., spiritual and mental) and external (e.g., physical) elements. According to this view, physical excellence in martial arts will not go without spiritual or mental cultivation (Kleinman, 1986). This approach can also be described as "holistic". Back and Kim (1984) described four criteria that need to be fulfilled to keep the status of a traditional Asian martial art: (a) recognition of national or cultural origin, (b) development of fighting skills, (c) presence of artistic aspects, and (d) spiritual development.

176 ICPE 2000 Proceedings
Efficiency Approach. The efficiency approach emphasizes effectiveness and application of the techniques in a fight. Martial arts in this approach are mainly practised for self-defense reasons. Although one might argue that this approach actually goes back to the origin of the martial arts, that is, to know how to protect oneself, in Asia this function has lost a great deal of its importance, as other functions became more important (e.g., aestheticism, health and fitness). For example, distinct changes in form, content and function have characterized the development of the Chinese martial arts (Theeboom & De Knop, 1997). In the West however, the efficiency approach is very popular.

Sporting Approach. The sporting approach does not focus primarily on the acquisition of fighting competence, but rather regards martial arts as sports with positive effects on the physical, mental and social state of its participants. Unlike the efficiency approach where "anything goes", in this third view the variety of fighting skills is restricted to what is allowed according to specific competition rules.

Martial Arts and Physical Education

As indicated earlier, the martial arts have become popular, especially among young people. In Europe, for example, they are not only popular as organized sports, in recent years there has been an interest to introduce martial arts in physical education classes at school (e.g., Calmet, Bourreley, & Ontanon, 1994; Janalik, 1997; Lohre, 1995). To determine the current status regarding the extent to which martial arts are actually part of the physical education curricula at schools in Europe, a questionnaire was sent to all 13 member countries of the European Physical Education Association (EUPEA) in which they were asked to provide more information regarding their country (Theeboom & De Knop, 1999). Nine out of 13 countries responded. These countries were Germany, The Netherlands, England, France, Belgium, Luxembourg, Ireland, Czechia and Estonia. In general, the questions related to two aspects: (a) the types of martial arts and the extent to which they are introduced during physical education classes and (b) the extent to which physical education teachers come in contact with martial arts during their teacher education.

Data indicated that in the majority of countries martial arts are introduced during physical education classes in secondary schools (i.e., for pupils 10 to 14 years of age). Only two countries, Ireland and Estonia, indicated that no martial arts were introduced. Findings showed that some disciplines are more popular than others: such as judo, karate and self-defense. Other disciplines are only introduced in a limited number of countries: aikido, boxing, wrestling, taekwondo, savate or French boxing and fencing. Data also revealed that martial arts courses range from 5 to 12 hours per year. In some cases, older pupils can choose optional classes with more hours (up to 35 hours). All but one of the countries introducing martial arts at school indicated that physical education curricula explicitly refer to martial arts. Only in England martial arts are not part of the national physical education curriculum, which makes the introduction of martial arts during physical education dependent on the individual interest of schools and teachers. Results also showed that in two-thirds of the countries (66.7%), teachers come in contact with martial arts during teacher education. Again, some specific disciplines were mentioned more than others: namely, judo and karate. Self-defense, boxing and wrestling are introduced in three of the responding countries that have martial arts instruction at school. Other disciplines are less popular: aikido, taekwondo and fencing. Most countries indicated that these martial arts instructional programs differ from one university to another with regard to the kind of martial arts that are taught as well as with regard to the number of hours per year. In general, this ranged from 25 to 60 hours per year.
Martial Arts Instruction

Often, martial arts instruction at school is regarded as an instruction in one specific discipline and most authors only describe the possibilities of that particular martial art in a physical education context, such as judo (Bronchart, 1990; Janalik, 1997; Vanderghote, Heylen, & Veulemans, 1990), aikido (Linden, 1984; Van Dongen, 1995); kendo (Calmet, Bourrely, & Ontanon, 1994; Kloen, 1995); karate (Thirion, 1990); taijiquan (Baron, 1993; Kolb, 1994); and taekwondo (Lohre, 1995). However, taking into account the wide variety of Asian martial arts and the fact that distinct differences exist between disciplines, instruction which is limited to only one style often provides a one-sided view on martial arts. Furthermore, the variation in approaches of martial arts practice should also be taken into consideration with regard to martial arts instruction in physical education.

The traditional approach is generally regarded as the most valuable as there is a common belief in its positive sociopsychological effects on participants (e.g., Devans & Sandler, 1997). A broad variety of values of the martial arts in physical education classes or to youth in general has been described in the literature: among others, aesthetic (Min, 1979); relaxation (Sparkes, 1985); movement awareness (Linden, 1984); strategic thinking (Spear, 1989) and conflict resolution (Hendrey, 1997; Abel & Raithel, 1997). Also, a number of authors have described their experiences of using the martial arts as a means of “movement meditation” during physical education courses or school sport activities (Gong & Ross, 1991; Janalik & Knörzer, 1986; Moegling, 1986a, 1986b; Paternmann, 1986; Sagot, 1992). They have indicated that Asian martial arts instruction can provide to all pupils an alternative to the highly product-oriented sports that are introduced during physical education classes. This alternative regards bodily movement as the purpose of all action (i.e., body awareness), instead of as simply a means to achieve external goals (e.g., scoring or performing). Although to date, the effect of movement meditation on pupils remains unclear, several studies have provided data regarding the impact of traditional martial arts practice on the psychological health and personal development of participants (e.g., Baron, 1993; Cummings, 1988; Reiter, 1975). A number of studies have specifically investigated the role of martial arts practice as an intervention strategy for specific target groups, such as behaviorally disordered adolescents (Gorbel, 1991) and juvenile delinquents (Gonzalez, 1990; Trulson, 1986). However, despite the positive psychological effects that are often reported by these and other studies (e.g., Duthie, Hope, & Barker, 1978; Konzak & Klawara, 1978; Nosanchuk, 1981), many have used cross-sectional designs to compare the personality traits of martial artists of different levels. Such a design does not rule out changes due to selection biases, because it is possible that participants with specific personality traits are more likely to persist in martial arts practice compared to others. As indicated by Fuller (1988), longitudinal studies are required to establish a more distinct cause-and-effect relationship with actual martial arts practice.

A number of studies not only investigated the psychological effects of traditional martial arts practice but also other outcomes as well, such as technical skill level (Caine, 1987/1989; Murray, 1981; Weinberg, Seabourne & Jackson, 1981). Most of these studies made use of a design in which different teaching approaches were compared. In general, findings were inconclusive as only in some of these studies did the traditional approach result in a more positive outcome.

In a more recent study, King and Williams (1997) found that participants in traditional martial arts classes showed a positive relationship between mastery motivational orientation, performance and enjoyment. This reported positive relationship can be
Asian Martial Arts in Western Physical Education

regarded as an important indication of its value in a pedagogical context. However, it is important to mention here that King and Williams' study only referred to adults. Other empirical data showed that children's involvement in a traditional martial arts program resulted in lower levels of enjoyment, performance and perceived physical competence compared to a mastery motivational oriented program (Theebom, De Knop & Weiss, 1995). Hsu (1986) has also indicated the difficulties Western participants encounter when becoming involved in traditional (Chinese) martial arts. Back and Kim (1984) even reported distinct differences in interest in the martial arts among Anglo students compared to Asian students. Their analysis showed that the former were less interested in the specific characteristics of traditional martial arts practice such as meditation, doing (analytical) drills and concentrating only on a few techniques at a time. Especially in a physical education context where martial arts are introduced only during a few lessons, one can expect that principles of traditional martial arts training will be difficult to understand for pupils and therefore might not attract them. However, this does not mean that once youngsters have found the way to more regular practice of Asian martial arts (e.g., in a sports club), they might be open for a traditional approach as they become more familiar with some of its specific characteristics. A mastery motivational oriented teaching method for youngsters within the martial arts might facilitate this step towards a traditional approach as it can be regarded as a more appropriate way of introducing them to Western children (Theebom & De Knop, 1998).

The efficiency approach is probably the most popular way in which the martial arts are introduced at secondary schools. Often, martial arts courses during physical education put an emphasis on self-defense (e.g., judo, karate, aikido, etc.). In most cases, a variety of effective self-defense techniques are taught as well as skills to improve ones assertiveness in an attempt to provide pupils a basic understanding on how to react to an assault. This emphasis on the use of an efficiency approach of martial arts instruction in physical education is probably based on the concerns that exist among educators with regard to the threats from crime and violence to children's personal safety. Although the situation in American schools is different from schools in Europe in that there is no martial arts instruction, some authors have argued in favour of introducing the martial arts through an efficiency approach at school. For example, in their study on self-defense knowledge among American elementary school students, Chen and Mauck (1999) concluded that there is a lack of systematic education relating to self-defense lessons at school. They recommended that "Self-defense should be included in the physical education curriculum, since its skill domain has the same nature as other sport skills. This profession should take leadership and majority of the responsibility for teaching children how to protect themselves against crimes." (p. 61). Although one can agree that the martial arts skills domain has a similar nature as other sport skills, emphasizing the self-defense aspects of martial arts practice in a physical education context is a one-sided view of the martial arts and might create the impression that self-defense is the only motivation for studying the martial arts. It disregards other values and functions of martial arts practice. Similarly, the rationale for teaching swimming skills during physical education cannot merely be regarded as a way of preventing pupils from drowning. Here too, other objectives can be pursued. Moreover, the one-sided approach where only self-defense aspects are emphasized, will help to confirm the notion that exist with regard to martial arts, in that they are mainly used to learn how to fight or to defend oneself.

Furthermore, it is important to put self-defense classes for pupils in a realistic perspective. Youngsters have to be properly informed about the actual efficiency of the techniques that they learn. They have to be aware that learning to defend oneself effectively in all situations cannot be taught within a few lessons; otherwise the teacher might bring about
false feelings of security among pupils, which can eventually put them in a vulnerable position. Also, as the efficiency approach emphasizes the acquisition of effective martial arts skills, one should take into account its possible impact on young children.

Consequently, the introduction of Asian martial arts in physical education should be viewed rather as a way to get to know the possibilities that exist when one wants to become involved in martial arts practice as a leisure activity. Pupils should discover that in essence martial arts are not different from other sports as they also can bring about feelings of enjoyment, sporting competence, and so forth (Boudreau, Folman, & Konzak, 1995). The fact that, through martial arts practice, one can also learn how to defend oneself, should be regarded as an important aim, but not as the only aim. Therefore, in our view, a sporting approach is to be recommended when dealing with martial arts instruction in physical education. An emphasis on a sporting approach of martial arts instruction will clearly involve a change in the mindsets of teachers, as martial arts practice in general is often regarded from a self-defense perspective. However, a sporting approach of martial arts instruction is more in accordance with one of the primary aims of physical education, that is, to prepare pupils for a healthy and sporting lifestyle through the introduction of a wide variety of sport experiences.

Categorisation of Martial Arts Techniques for Physical Education

Taking into account the wide variety of Asian martial arts that exists, one can wonder what criteria should be used for an introduction at school. First of all, it can be argued that every martial art is suitable to be used during physical education classes. It is not a matter of choosing a specific martial art, but rather of choosing the appropriate approach (holistic, efficiency or sporting). The sporting approach, in view of its specific characteristics, can be regarded as a very suitable way of introducing martial arts at school as it can include every discipline. Although the holistic approach might also be a valuable alternative, it can be expected that within the context of only a few lessons, its basic principles might be hard to understand for pupils. However, this does not mean that once youngsters have found the way to a more regular practice of the Asian martial arts, they might be open for a more holistic approach. For example, Van Dongen (1995) described his successful experiences with using a more holistic approach to aikido in a physical education setting.

Secondly, although the differences (e.g., on technical, tactical and physiological level) between a number of Asian martial arts (e.g., judo and karate) is probably bigger than the differences between many other sports that are introduced seperately during physical education classes (e.g., handball, soccer, basketball), one can hardly expect that martial arts will by introduced seperately. Therefore, a more realistic solution can be situated in a general introduction of the Asian martial arts during physical education classes in which pupils learn about the variety that exists. Consequently, a general categorisation of the most important martial arts techniques is needed. In table 1 an attempt is made to categorise a variety of suitable martial arts techniques during physical education classes.
Table 1: Categorisation of the Asian Martial Arts.

<table>
<thead>
<tr>
<th>category (kind of technique)</th>
<th>martial art</th>
</tr>
</thead>
<tbody>
<tr>
<td>throws, holds, joint-locks</td>
<td>jodo, jiu-jitsu, nin-jitsu, aikido</td>
</tr>
<tr>
<td>leg techniques (e.g., kicks, jumps)</td>
<td>karate, taekwondo, wushu, Thai boxing</td>
</tr>
<tr>
<td>arm techniques (e.g., punches, seizing)</td>
<td>karate, Thai boxing, wushu, jiu-jitsu, nin-jitsu, taekwondo, pencak silat</td>
</tr>
<tr>
<td>use of weapons (stick, sword,...)</td>
<td>wushu, kendo, pencak silat, aikido</td>
</tr>
<tr>
<td>self-defense</td>
<td>all martial arts, in particular jiu-jitsu, aikido and nin-jitsu</td>
</tr>
</tbody>
</table>

This categorisation does not mean that only the abovementioned martial arts have these characteristic techniques. For example, there are also leg techniques in jiu-jitsu. However, one can say that the described techniques are more typical for the martial arts that are mentioned here.

A general introduction of the Asian martial arts could highlight a number of basic techniques from each category, thereby explicitly referring to the various martial arts. In this way, pupils can learn about the variety that exists and can continue in one particular discipline if they are interested. This kind of general introduction can take place during a couple of lessons and does not demand a great technical competence of the teacher as the techniques are only on a basic and general level (e.g., these skills can easily be taught during a refreshers’ course for physical education teachers).

This paper has not paid attention to other martial arts (e.g., boxing, French boxing, wrestling, fencing,...). However, when talking about an introduction of martial arts in the physical education curriculum one cannot neglect these disciplines as well. In fact, these martial arts also fit into the categorisation that has been made in Table 1. For example, some basic wrestling techniques fit well in the category "throws, holds,...". With regard to the introduction of boxing techniques during physical education classes, it has been indicated that the approach of school boxing differs distinctly from competitive boxing (Bresciani, 1992; Timmers, 1996). For example, boxing at school only allows pupils to touch, in stead of punch, one another. Introducing boxing techniques to youth should only include a variety of games where contact is limited and rules are very strict. Basic boxing and savate techniques can be placed in the "arm techniques" category. This last martial art can also be used in the "leg techniques" category. As an example of a martial art in the "weapons category". Kloen (1995) described how to introduce fencing during physical education classes through the use of "stick fencing and fighting".

CONCLUSION

The present paper has argued in favour of a sporting approach of martial arts instruction at school as it provides a broader perspective of martial arts practice. One might indicate that a traditional approach can offer an even broader perspective as it can provide a good setting for multicultural experiences and learning. Indeed, the introduction of a traditional approach of martial arts instruction at school can be situated in what De Sensi (1995) has described as "... the ongoing major educational reform initiative aimed toward multiculturalism ...". (p. 34), in which specific additions to the physical education
curriculum have been suggested such as international games, dance and sport activities. However, as studies have showed that Western youngsters encounter difficulties to fully understand the underlying principles of a traditional approach due to distinct cultural differences, it will be necessary first to develop pedagogically sound teaching strategies through which the Asian martial arts can be introduced during physical education classes without disregarding their unique characteristics.

REFERENCES


182
Asian Martial Arts in Western Physical Education


Effects of Community Sport Participation on Adolescent Emotional Status

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Abstract
This study was conducted to construct an assessment instrument for high school student behaviors that were acquired by participation in a sport program of community sport centers. A questionnaire was constructed and mailed to 160 high school students with a return rate of 73%. Nine professionals were requested to proof read the questionnaire for content validity. In addition, factor analysis was employed for the construct validation. The factor analysis delineated four factors from the questionnaire: humility, communication skill, self-esteem, and persuasion. Reliability was estimated using the split-half method to be 0.82. The efficiency of the tool was verified using a repeated measure ANOVA. The results indicated that the tool was sufficient to measure an improvement of the behaviors of interest. ANOVA results indicated that length of participation in the program demonstrated statistical significance (F=17.60, p<0.01). On the other hand, there were no significant differences in gender for acquiring social behavior. The results clearly show a positive effect of participation in the community center program.

INTRODUCTION
Our basic social institutions such as school, church, or home, are undergoing great changes. Our mobile population also contributes to changes in socialization. With a highly mobile population, working mothers, single parents, and reconstituted families, the family unit as a stable and predictable social institution is now problematic.

As a result, basic perceptions and attitudes of the youth are more divergent and less predictable, creating a need for educational options. Most Korean parents have thought that education is for extending knowledge. Schools have been considered as a place to develop a holistic mind or to cultivate morality. However, as never before in Korean history, students consider their school as a place only to extend knowledge. During high school, students are required to study hard and behave appropriately as his/her boundaries expand to an educational institution like school. In contemporary society, a student seems to experience more stress due to higher expectations and demands before they are fully ready and mature (Stephens, 1971). Previous studies have consistently shown that there were no documents about emotional status in sport participation. Therefore, a study investigating the relationship between sport participation and emotional status is noteworthy (Cartledge, 1984). While schools continue to emphasize cognitive processes, students’ learning outside classrooms involve all of their senses (Wood, 1975). And while school personnel continue to focus on intellectual development, the students’ emotional
status is influenced by movies, junk journals, the Internet, and TV. However, there are only a few studies that have investigated the emotional status of high school students in Korea.

This study was conducted to verify teenagers’ emotional status when they participate in a sport. The teenagers’ emotional status was investigated in regards to levels of modesty, expression, self-confidence, and driving force.

METHOD

Procedure

This study was designed to explore variables related to high school students’ emotional status. Also, this study investigated participation in sport activities. For the purpose of this study, a self-administered questionnaire was developed. The questionnaire was developed through a pilot study which included reliability and validity checks (Arnold, 1984; Dillman, 1983; Walls et al., 1977). After the pilot study, the primary research included making the test sheet, behavioral questionnaire, and analyzing the data (Quay et al., 1979; Rie et al., 1978). The questionnaire was administered from September 17, 1999 through October 10, 1999.

Subject

The subjects were third-year high school students (male=110, female=50) who participate in a physical fitness program of a community sports center (Korea social sports center). The duration of the program was one semester (15 weeks). Table 1 indicates the subjects’ levels of sport participation in the community sports center used in this study.

<table>
<thead>
<tr>
<th>Duration (month)</th>
<th>Number</th>
<th>Percentage (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>21</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>32</td>
<td>20</td>
<td>66</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>14.5</td>
<td>89</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>15</td>
<td>113</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>14.5</td>
<td>136</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>15</td>
<td>160</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100</td>
<td>160</td>
</tr>
</tbody>
</table>

Assessment Tools

This study was an exploratory survey to explain emotional status of high school students. Therefore, an assessment tool consisting of Likert-type questions was constructed following a literature review (Humphreys et al., 1979). The Cronbach-Alpha was used to estimate reliability. Based on the pilot study results, the reliability coefficient was found to
be 0.85. In addition, a split-half reliability coefficient was also determined in order to minimize the chances of the instrument being unreliable.

**Analysis Data**

Demographic variables of subjects were analyzed by descriptive statistics. ANOVA was used to test the representativeness of the population as well as the effects of interest.

**RESULTS**

1. Analysis regarding modesty

Analysis of Variance was employed to examine modesty levels of the subjects according to the periods of sport participation. The test results indicate that modesty level has a statistical significant relationship to sport participation \[ F(9.80)=8.82, p<0.01 \]. Subjects who have a longer period of sports participation demonstrated higher levels of emotional status. Table 2 indicates the results of students' modesty according to sports participation.

**Table 2: ANOVA Summary Table about Modesty**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation’s duration</td>
<td>9</td>
<td>2019</td>
<td>229</td>
<td>8.82</td>
<td>0.01</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
<td>2.52</td>
<td>2.52</td>
<td>0.10</td>
<td>0.75</td>
</tr>
<tr>
<td>Participation’s duration * sex</td>
<td>9</td>
<td>169</td>
<td>18</td>
<td>0.72</td>
<td>0.69</td>
</tr>
<tr>
<td>Error</td>
<td>80</td>
<td>2085</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Analysis regarding expression

Expression levels of the subjects were tested by periods of sport participation. The test results indicate that the expression level has a statistical significant relationship to the length of sport participation \[ F(9.80)=17.06, p<0.01 \]. Subjects who have a longer period of sports participation demonstrated higher levels of expression. Table 3 reports the results of students’ expression levels according to sports participation.

**Table 3: ANOVA Summary Table about Expression**

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation’s duration</td>
<td>9</td>
<td>4631</td>
<td>514</td>
<td>17.06</td>
<td>0.001</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
<td>1.92</td>
<td>1.92</td>
<td>0.07</td>
<td>0.79</td>
</tr>
<tr>
<td>Participation’s duration * sex</td>
<td>9</td>
<td>385</td>
<td>42</td>
<td>1.46</td>
<td>0.17</td>
</tr>
<tr>
<td>Error</td>
<td>80</td>
<td>2339</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>7381</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Analysis regarding self-confidence

The self-confidence level of the subjects was tested by periods of sport participation. Results of the ANOVA indicated that subjects’ level of self-confidence increased highly according to levels of sports participation. However, there was no statistical significant difference according to gender. Table 4 indicates the results of students’ self-confidence levels according to extent of sports participation.

Table 4: ANOVA Summary Table about Self-Confidence

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation’s duration</td>
<td>9</td>
<td>3181</td>
<td>353</td>
<td>13.90</td>
<td>0.001</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
<td>0.46</td>
<td>0.46</td>
<td>0.02</td>
<td>0.89</td>
</tr>
<tr>
<td>Participation’s duration * sex</td>
<td>9</td>
<td>47</td>
<td>5.30</td>
<td>0.26</td>
<td>0.99</td>
</tr>
<tr>
<td>Error</td>
<td>80</td>
<td>807</td>
<td>10.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>1678</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Analysis regarding driving force

The driving-force of subjects was tested according to the different levels of sport participation. There was no statistically significant relationship between sex and duration of sport participation. Table 5 indicates the results of students driving-force levels according to sports participation.

Table 5: ANOVA Summary Table about Driving-Force

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation’s duration</td>
<td>9</td>
<td>291</td>
<td>39</td>
<td>1.03</td>
<td>0.12</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
<td>20.31</td>
<td>20.31</td>
<td>2.01</td>
<td>0.15</td>
</tr>
<tr>
<td>Participation’s duration * sex</td>
<td>9</td>
<td>84.97</td>
<td>9.44</td>
<td>0.94</td>
<td>0.49</td>
</tr>
<tr>
<td>Error</td>
<td>80</td>
<td>807</td>
<td>10.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>1678.19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION

This study was designed to investigate the emotional status of high school students preparing for college entrance exams following various periods of sport participation. Dependent variables concerning emotional status included: modesty, expression, self-confidence, and driving-force. The results indicated that there was no difference in level of sociality according to sex, that sociality was enhanced by the duration of sport participation in three domains, with the exception being driving-force. Emotional status varied according to the different domains based upon students’ participation in the social sport program. The reason for this difference is gap of adoption speed (Inskeep, 1960). For instance, the measure of expression revealed a gap of 20.67 from the beginning and end, while that of driving-force showed a gap of only 10.05. These results can be understood since expression has a major effect on social sport programs (Falvey, 1989; Stephens, 1971). In that way, social sport programs influence the development of adolescent’s physique, learning of sports skill, effect of recreation, and sociality of
adolescents (Brown, 1980; Bolstad et al., 1972; Bandura, 1973). Therefore, the most
important outcome of this study will be promoting the preparatory college student’s
physical activity programs by increasing their positive perception toward their emotional
development (Carledge, 1984).

REFERENCE

Development, 55, 527-536.
Behavior, 14(2), 32-41.
School District.
Dillman, K. (1993). Main and other Self-administrated Questionnaire. In W. Rossi (Eds.), Handbook of Survey. NY :
Wiley.
5605.
Quay, C., & Peterson. (1979). A Survey of Behavior Rating Scale for Children. Division of Mental Health, Columbus,
OH.
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TEACHING OF PHYSICAL EDUCATION AND SPORTS
Alternative Assessment in Physical Education:
“A Double-Edged Sword”

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Abstract
The last decade has witnessed considerable reform efforts in educational programming in an attempt to improve schooling in the United States. A cornerstone of much of this educational reform has been the specification of learner outcomes, framed in the context of “standards” which define what students should know and be able to do. Closely linked to the standards movement is a greater emphasis on assessment - assessment for the purpose of guiding instruction and assessment for the purpose of demonstrating accountability in the classroom. The movement towards standards-based education system and greater prominence of assessment has impacted physical education classes just as it has other subject areas. For instance, in 1995 the National Association for Sport and Physical Education (NASPE) published national physical education standards for the first time in history. Traditional assessment practices in school physical education have been criticized for being unrealistic and not particularly meaningful for teachers or students. Many authorities recommend the use of “alternative assessments” as a viable substitute or compliment to the more traditional, standardized assessment practices. While alternative assessments come in many forms, in general they are thought to be more authentic in nature, less difficult to administer, and more fully integrated with the teaching process. Yet, some experts question the appropriateness of alternative assessments on the basis of psychometric characteristics such as validity and reliability. This presentation will provide examples of alternative assessment techniques for school physical education and discuss the advantages and disadvantages of their use.

INTRODUCTION
As the landscape of American education continues to evolve and change, alternative forms of assessing student learning and achievement are changing measurement and evaluation practices in our schools. In fact, it has been suggested that a cornerstone of the educational reform movement in the United States today is assessment (Herman, Aschbacher, & Winters, 1992). Assessment seems to be the buzzword in education today, being touted by school administrators, curriculum directors, measurement experts, and teachers as the key to effective teaching, and thus student learning. Unfortunately, the term is often used inappropriate by both teachers and administrators. Quite literally, “assessment” may be defined as the process of collecting information and then making a judgment or interpretation of its meaning. In other words, assessment includes both measurement, the process of collecting information, and evaluation, the process of judging the value of the collected information. Many acknowledged measurement authorities in education point to a new form of student assessment, known variously as “alternative assessment” or
“authentic assessment” or even “performance assessment” as providing a much richer and more complete picture of what students know and are able to do (Wiggins, 1989; Herman, Aschbacher, & Winters, 1992). This movement towards new forms of assessment is motivated, at least in part, by the belief that these assessment methods facilitate teaching, enhance learning, and result in greater student achievement (Wiggins, 1991; Linn, Baker, & Dunbar, 1991). Such assessment is supposedly inextricably linked to and performed as an integral part of the instructional process.

**ALTERNATIVE ASSESSMENT DEFINED**

But what is “alternative assessment” and what should it mean to real-world physical education programs? According to Wood (1996, p. 213), “traditional psychometric assessment devices (e.g., multiple choice tests, sport skills tests) may no longer be sufficient for assessment in the quickly changing educational landscape characterized by emphasis on learning outcomes, higher order cognitive skills, and integrated learning.” Furthermore, traditional assessment devices tend to measure narrowly defined characteristics, do not facilitate integration of skills or processes, and are frequently artificial in nature. This has resulted in an emerging shift to more and more alternative assessments in physical education.

The Office of Technology Assessment (OTA) of the U.S. Congress (1992) has defined performance assessment as “testing methods that require students to create an answer or product that demonstrates their knowledge and skills.” This definition notwithstanding, there is a lack of universal understanding among educators as to what constitutes alternative assessment, although it generally refers to any type of assessment task other than the traditional, standardized paper and pencil, multiple choice type of test. Alternative assessment is thought to be performance-based, requiring students to demonstrate specific skills and competencies rather than simply selecting one of several predetermined answers to a question (Stiggins, 1987). Furthermore, Wiggins (1993) suggests that performance-based assessment requires the student to execute a task and bring it to completion. In effect, the student places his or her skill on exhibition, a performance that is valued in its own right, unlike traditional standardized tests that derive value based upon their relationship to other valued outcomes. Moreover, assessment is said to be authentic when the assessment task is designed to take place in a real-life setting, one that is less contrived and artificial than traditional forms of testing. In other words, the assessment task has contextual significance. Please note that authenticity is not a dichotomous characteristic, being either present or absent; rather, authenticity is a multi-dimensional characteristic existing in varying degrees. In addition, it is also said that alternative assessment emphasizes higher level, more complex reasoning skills. Alternative assessment techniques are varied in both method and scope, and may include, but are not limited to teacher observation, portfolios, essays, performance tasks, exhibits, projects or experiments, oral discourses, and event tasks.

While some educators herald alternative assessment as being innovative, in reality many of these techniques have been used by teachers for years. This is especially true in our field where the very nature of the content of physical education frequently manifests itself in directly observable, overt behavior, particularly when considering the psychomotor domain. In fact, advocates for alternative assessment methods, performance assessments in particular, have often used examples from sport as their primary analogy in explaining their positions (Wiggins, 1993). Yet, it is largely the dissatisfaction with the standardized, traditional multiple-choice type of test that has triggered the call for change in assessment.
Alternative Assessment in Physical Education: “A Double-Edged Sword”

techniques. This type of fixed-response testing format is hardly the core of assessment practices in physical education, but our field seems to be pulled into the swirl of activity surrounding the movement towards alternative assessment. The resulting ferment has led to an insatiable craving by physical education teachers for “authentic assessments” that will dramatically change student performance in the gymnasium. Proponents of alternative assessment are quick to claim that these new assessment techniques enhance instruction and facilitate the achievement of important educational objectives; but can they live up to these lofty expectations? What do we really know about the adequacy and appropriateness of alternative assessment, particularly as applied to school physical education?

HISTORICAL PERSPECTIVE OF ASSESSMENT IN PE

We must be careful of encouraging professional practices that promote the appearance of academic rigor and quality assessment, when in fact standards of assessment quality have been abandoned. Such practices place students directly in harm’s way.” We need to look critically at the quality of our assessment practices and adhere rigorously to standards of quality. Therefore, perhaps we should first take a look at the assessment practices being used in school physical education. Numerous articles have appeared in the professional literature during the past 25-30 years that seem to point to one inescapable fact -- that assessment practices of school physical education teachers fall far short of what is recommended (Imwold, Rider, & Johnson, 1982; Hensley et al., 1989; Matanin & Tannehill, 1994). Report after report cite examples of little systematic assessment being conducted, the use of inappropriate factors such as participation, attendance, and being in proper uniform as the basis for evaluating student achievement in physical education, and the frequent use of subjective observational methods to assess students. The conclusions of these reports clearly suggest that there is a significant gap between theory and practice in regard to assessment practices in school physical education.

Maybe, just maybe, the gloomy situation often reported in the literature just isn’t so! Or at the very least, maybe it is not as bad as we have been led to believe. Physical education provides many, many opportunities for the student to exhibit behaviors that may be directly observed by others, a unique advantage of working in the psychomotor domain. The nature of performing a sports skill makes assessment through observational analysis and subjective judgment a logical choice for many physical education teachers. I would propose to you that performance-based assessment methods have been used by physical educators for many years. Students have been asked to perform a variety of tasks that are rather straightforward and designed to assess fundamental skills such as throwing, catching, or jumping as well as more complex skills such as serving a tennis ball or dribbling a soccer ball, etc. In fact, the literature shows that a preponderance of physical education teachers employ such methods as the foundation for their assessment system (Imwold, Rider, & Johnson, 1982; Hensley et al., 1989). Interestingly, such assessment practices that depend upon the judgment of observers have frequently been criticized by measurement experts in physical education and exercise science -- criticized on the basis of questionable validity and reliability, being susceptible to personal bias, the lack of objective scoring, as well as the belief that such assessment is conducted in a haphazard manner with little rigor. These criticisms notwithstanding, the use of performance-based, observational assessment may provide the best hope for physical educators. Such assessment can be user-friendly, authentic, and yet provide meaningful and relevant information for both the teacher and student. It is in this regard that we have reason to question the gloomy reports of assessment practices in school physical education. Perhaps
physical education teachers are actually in the forefront of the assessment trend that is occurring today, yet have not been appropriately recognized nor helped by a measurement community in physical education and exercise science that has sought to promote unrealistic standards and continues to recommend impractical tests and assessment techniques for school physical education.

STANDARDS FOR SOUND ASSESSMENT

Let me assure you that I am not a traitor to the high ideals and standards of quality that have been laid before us. I merely asked that the standards of quality we set for assessment in school physical education be fair, practical, and reflect the current status of physical education in our schools. I am not convinced that the measurement community in physical education has adequately addressed the needs of the physical education teacher. Stiggins (1987) proclaims five key standards to sound assessment practices: (1) clear and appropriate achievement targets for our students, (2) clear reasons for assessing, (3) appropriate assessment methods, (4) appropriate sample from the domain of interest, and (5) reducing bias and distortion. I see no reason to object to any of these standards, they can certainly provide the framework for guiding assessment practices in physical education. I would like, however, to address a couple of these in more detail.

The first standard is concerned with identifying clear and appropriate achievement targets for our students. In any assessment context, we must begin the assessment process with a clear vision of what it means for our students to succeed. All too often it appears that the expectations of students in physical education class have not been clearly defined. This, I believe, is one factor that has contributed to the widespread practice of assessing a multitude factors (e.g., attendance, dressing out, attitude, etc.) unrelated to student performance or achievement in physical education. Hopefully, improvement will be made in this area as teachers and school districts become familiar with the national standards for physical education. Published by the National Association for Sport and Physical Education (NASPE) in 1995, the national standards delineate what students should know and be able to do at various grade levels upon completion of a quality physical education class. In effect, the national standards establish the achievement targets for students in physical education. Moreover, the standards document calls for assessment practices to be linked to the various standards and provides example alternative assessment tasks that may be used to complement the more traditional forms of assessment. With the increased attention being given to the national physical education standards, I am hopeful that both schools and teachers will make a quantum leap in clearly specifying appropriate expectations for students in physical education. It is incumbent upon the measurement and evaluation authorities to seize this opportunity and provide clear guidance concerning the appropriate use of assessment in the teaching process.

A second standard that warrants additional discussion pertains to the design and use of appropriate assessment methods. As you are well aware, there are hundreds of examples of standardized sport skill and motor performance tests that have been published. Although the large majority of these tests report evidence indicating acceptable psychometric properties, surveys of school physical education teachers tell us that relatively few teachers use standardized tests of any type, with the lone exception of physical fitness tests (Hensley et al., 1989). Clearly, teachers are making a statement about the usefulness of available tests in the physical education classroom. A statement, I might add, that is probably wise considering the significant number of barriers typically facing the physical education teacher. Although my purpose here is not be condemn
existing standardized tests, measurement experts and test developers in physical education and exercise science must recognize that the large majority of existing tests are not meeting the needs of the students and teachers for which they were designed. The landscape of assessment of student performance in physical education is in dire need of newer, alternative assessment techniques that pose more realistic situations, yet capture the essence of the construct of interest, thus providing greater hope for improved instruction and better learning. Moreover, we must move towards an acceptance of observation and informed judgment as an appropriate method of performance assessment. In fact, mere acceptance is not enough, we also need to take the leadership in establishing standards for performance assessment in physical education, including guidelines for conducting performance assessments in an appropriate manner. Without proper guidance and meaningful standards, bias and distortion will no doubt lead to the ill-advised measurement of student achievement and performance. We must strive to ensure that our assessments are fair, accurate, and meaningful and that they adhere to the standards of quality.

Is there a viable solution to the assessment and grading dilemma facing many school physical education teachers? It is unlikely that school administrators and policy makers will help much in the short term. Lengthening class periods, increasing the frequency of class meetings, reducing class size, or hiring new staff or support personnel is an unlikely solution in most schools at this time. Teachers will continue to limp along with little support from the school administration. Is it possible to change the assessment paradigm that is being used in schools today and provide the tools needed to get the job done? Perhaps! But this will require measurement experts, pedagogy specialists, and practicing teachers to work more closely together towards the determination of a viable solution. We must take greater responsibility for the assessment practices that are being used in physical education classes today as well as those that will be used tomorrow.

As previously stated, performance-based assessment methods have been used by physical educators for many years. Students have been asked to perform a myriad of tasks which are rather straightforward and designed to assess skills such as throwing, catching, putting, serving a tennis ball, passing a volleyball, etc. Whereas the majority of published sport skills tests are performance-based, requiring the student to complete a task or demonstrate a prescribed skill, relatively few are high in authenticity. That is, the context in which the assessment is conducted and the task performed is artificial in nature and bears little resemblance to a real-life situation.

A desirable alternative assessment technique should consider both context (situation/task) and performance (construct/skill). That is, the assessment task should represent a completed performance having contextualized meaning that is directly related to the eventual use of the skill (Siedentop, 1996). The ground-stroke test in tennis in which the student is suppose to hit a ball tossed by the teacher into a target area on the other side of the net is fairly representative of most assessments in the psychomotor domain, and sport skill tests in particular, in that the assessment task typically involves a performance of some type, but rarely provides contextual meaning. Moreover, according to Siedentop (1996, p. 250), “... most teaching in physical education emphasizes skill development tasks, often isolated from their contextual performance in contests.” Students are taught specific skills, frequently practice these skills in regimented drills, and then are tested on their ability to perform these isolated skills using standardized tests. For example, students learn to dig, to forearm pass, and to overhead pass in volleyball skill drills, but often cannot play a game of volleyball to make for a satisfying experience.
Investigations of measurement practices of physical educators have consistently shown a reliance upon subjective assessment methods (Imwold, Rider, & Johnson, 1982; Hensley et al., 1989; Matanin & Tannehill, 1994). Observing students perform various tasks, skills, or activities is a common occurrence in physical education class, although some teachers may not recognize its potential for assessment while others may use observational techniques as the foundation of their assessment program. Unfortunately, the observations are typically unsystematic, not judged against well-defined criteria, and not recorded. Regardless, we should all recognize that assessment is an integral part of good teaching, not merely an appendage that is used solely for grading purposes. When we talk of authentic assessment of psychomotor skills or activities common in physical education, it is important to recognize that often there is not a single correct response or performance; there are a variety of ways to satisfactorily perform the designated activity or skill. This is particularly important to recognize when we consider the use of observational assessment techniques. Consequently, students' performance of sport skills (psychomotor skills) must be judged against well-defined criteria that directs attention to the dimensions of the performance itself. Such criteria not only serves to guide the assessment process, but also serves to promote learning by offering clear performance targets to students. Criteria for judging student performance have been called many things, scoring guidelines, rating scales, checklists, and more recently, rubrics or scoring rubrics. For purposes of this paper, the term scoring rubric will be used, but regardless of the name, it represents the backbone of an effective performance assessment system.

SCORING RUBRICS

According to Marzano, Pickering, and McTighe (1993, p. 29), a scoring rubric consists of a fixed scale and a list of characteristics describing performance for each of the points on the scale. Thus, what we call a scoring rubric today is very comparable to rating scales that have been used in physical education for many years. Although the form may be similar, its use may differ from that of previous years in that scoring rubrics serve to facilitate instruction and should be provided to students, parents, administrators, etc. rather than being a secretive document upon which the teacher mysteriously bases students' grades.

A scoring rubric for the forehand and backhand drive in tennis is shown in Figure 1. This has been adapted from the rating scale used for validation purposes with the AAHPERD Tennis Skills Test (Hensley, 1989).
**Figure 1: Sample Scoring Rubric for Forehand/Backhand Drive**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - Excellent</td>
<td>Proper grip, good balance, footwork, and near perfect form. Consistently demonstrates correct stroke mechanics. Shots are hit with power and consistently placed appropriately.</td>
</tr>
<tr>
<td>4 - Good</td>
<td>Proper grip, good balance, adequate footwork, and acceptable, but not perfect form. Demonstrates above average consistency of stroke mechanics. Moderate power and consistent placement within court area.</td>
</tr>
<tr>
<td>3 - Satisfactory</td>
<td>Proper grip, acceptable balance, but footwork is poor. Form is somewhat erratic and inefficient, resulting in inconsistent shot placement. Style of stroke is more defensive in nature, but can sustain a short rally.</td>
</tr>
<tr>
<td>2 - Fair</td>
<td>Uses improper grip at times, poor footwork, and basically incorrect form. Inconsistent stroke mechanics. Defensive style of play, merely trying to get the ball over the net. Unable to sustain a rally.</td>
</tr>
<tr>
<td>1 - Poor</td>
<td>Incorrect grip, off-balance, with poor footwork. Form is very poor and erratic. Virtually no control of ball placement. Experiences difficulty in getting ball over net.</td>
</tr>
</tbody>
</table>

Obviously, the sample scoring rubric illustrated above is designed to assess a discrete skill, either the forehand or backhand drive in tennis. The teacher simply observes the student's performance and then attempts to match their impression of the performance to the specified criteria on the scoring rubric. The observation and accompanying assessment could be accomplished while the student is performing specific skill drills, practicing with a partner, or during actual game play. The authenticity of the assessment will certainly be enhanced if it is conducted during a tennis game or match, thus giving contextualized meaning to the performance.

Assessing a student's forehand or backhand stroke in the manner described above may be most useful when conducted for diagnostic purposes related specifically to the skill or task in question (termed analytic assessment), but does little to indicate if the student can actually play a game of tennis. Rather than merely assessing an isolated skill such as the forehand or backhand drive in tennis, I would suggest that teachers need to also focus on holistic assessment in which the overall quality of actually playing the game, tennis in this case, is judged. Whereas analytic assessment may provide useful feedback about the student's strengths and weaknesses of individual skills, holistic assessment is both more efficient and more powerful, requiring the student to integrate knowledge of the game, strategy, and a variety of skills into a single, authentic performance. Such an approach is likely to be faster and simpler than performing analytic assessments for a number of independent skills. Keeping with the tennis example, Figure 2 illustrates a scoring rubric designed to be used for the holistic assessment of tennis playing ability.
Figure 2: Sample Scoring Rubric for Tennis Playing Ability

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - Excellent</td>
<td>Demonstrates mastery of tennis skills and ability to consistently execute all strokes with little or no conscious effort resulting in few unforced errors. Extensive knowledge base. Anticipates opponents shots and employs effective strategy specific to the task or situation.</td>
</tr>
<tr>
<td>4 - Good</td>
<td>Demonstrates competency and ability to perform basic tennis skills without making many errors. Complete understanding of rules and strategies of tennis. Usually selects appropriate strategy and shot selection for situation and generally displays consistent performance.</td>
</tr>
<tr>
<td>3 - Satisfactory</td>
<td>Displays basic understanding of tennis and is able to perform fundamental skills adequately to be able to play game. Performance is frequently inconsistent, resulting in numerous errors being made. Understands basic strategies, but lacks ability to effectively employ.</td>
</tr>
<tr>
<td>2 - Fair</td>
<td>Demonstrates inability to perform more than the basic skills. Has difficulty in executing even the basic skills, making frequent errors. Some critical, during performance. Generally inconsistent performance with only a minimal understanding of strategies and rules.</td>
</tr>
<tr>
<td>1 - Poor</td>
<td>Rarely, if ever, performs skills well enough to be able to play a meaningful game of tennis. Demonstrates little understanding of tennis and inability to execute skills without making significant and frequent errors. Makes little attempt to adjust performance.</td>
</tr>
</tbody>
</table>

Inasmuch as sport involvement, in the broadest sense, has been and continues to be a major goal of school physical education in this country, it is not surprising to see that student skill acquisition is a significant objective of most curricula. Furthermore, the first of seven national standards in physical education proclaims the importance of skill acquisition as it states: “Demonstrates competency in many movement forms and proficiency in a few movement forms.” (NASPE, 1995, p. 2). It seems a safe assumption that the teaching of psychomotor skills, particularly sport skills, will continue to be a major component of our physical education programs. As I have proposed in this article, the use of observational analysis with carefully developed scoring rubrics will aid teachers in their instruction and assessment of sport skills. Designing scoring rubrics can be quite a time-consuming task, particularly if one follows an analytical approach to assessment and attempts to assess students’ performance on the multitude of skills presented in a typical physical education class. In order to guide teachers in the design of scoring rubrics for the holistic assessment of sport skills, a generic scoring rubric is provided for you in Figure 3. Teachers can then adapt this generic scoring rubric to the specific elements of a particular sport or activity. The degree of adaptation depends on the wishes of the teacher. It can be as simple as adding the name of the sport or activity, or it can provide much more specificity. Note the similarity between the scoring rubrics in Figures 2 and 3.
Figure 3: Generic Scoring Rubric For Holistic Assessment of Sport Skills

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - Excellent</td>
<td>Demonstrates mastery of sport specific skills and ability to consistently perform with little or no conscious effort resulting in few errors. Extensive knowledge base and understanding of sport or activity. Employs effective strategy specific to the task or situation.</td>
</tr>
<tr>
<td>4 - Good</td>
<td>Demonstrates competency and ability to perform basic skills without making many errors. Complete understanding of rules and strategies of the specific sport or activity. Usually selects appropriate strategy and skill for situation and generally displays consistent performance.</td>
</tr>
<tr>
<td>3 - Satisfactory</td>
<td>Displays basic knowledge of sport or activity and ability to perform fundamental skills adequately to be able to play game. Performance is frequently inconsistent, resulting in numerous errors being made. Understands basic strategies, but lacks ability to effectively employ.</td>
</tr>
<tr>
<td>2 - Fair</td>
<td>Demonstrates inability to perform more than the basic skills. Has difficulty in executing even the basic skills, making frequent errors, some critical, during performance. Generally inconsistent performance with only a minimal understanding of strategies and rules.</td>
</tr>
<tr>
<td>1 - Poor</td>
<td>Rarely, if ever, performs skills well enough to be able to play a meaningful game. Demonstrates little understanding of sport or activity and inability to execute skills without making significant and frequent errors. Makes little attempt to adjust performance.</td>
</tr>
</tbody>
</table>

As physical educators strive to improve the quality of their programs, many will heed the reform initiatives of education experts who propose that outcome-based education and authentic assessment offers great promise for the enhancement of the American education system. In order to better prepare physical education teachers to be able to conduct meaningful assessments in their classes, our profession needs to embrace a new way of thinking about assessment. Although I am proposing that physical education teachers need to include more holistic assessment of skills in their instruction, I am not suggesting that teachers completely abandon analytic assessment techniques. There is a need for both, depending upon the purpose of the assessment. The use of holistic assessment of sport skills, however, is probably more appropriate for high-stakes testing and grading purposes. Regardless of the approach taken, I do advocate that teachers utilize observational analysis techniques combined with well-conceived scoring rubrics for meaningful skills assessment in physical education class. The design and incorporation of clear, developmentally appropriate, and explicitly defined scoring rubrics with one's subjective judgment of student performance is essential to ensure the validity, consistency, and fairness that is needed. The guidelines presented in Table 1 (adapted from Gronlund, 1993) provide ways to improve the credibility and usefulness of authentic skills assessment in physical education.

Table 1: Tips for Improving Skills Assessment

1. Insure that assessments are congruent with the intended outcomes and instructional practices of the class.
2. Recognize that observation and informed judgment is a legitimate and meaningful method of assessment.
3. Use an assessment procedure (i.e., holistic, analytic) that is appropriate for the use to be of the results.
4. Utilize authentic tasks in a realistic setting, thus provide contextualized meaning to the assessment.
5. Design and incorporate clear, explicitly defined scoring rubrics with the assessment.
6. Provide scoring rubrics and evaluative criteria to students and other interested persons.
7. Be as objective and fair as possible in observing, judging, and recording the performance.
8. Record assessment results as soon as possible after the observation.
9. Use multiple observations whenever possible.
10. Supplement observational skills assessment with other evidence of achievement.

CONCLUSIONS

In closing, I recommend that we should not indiscriminately discard the standardized skill tests and motor performance tests that are presently available. A balanced approach to assessment is the prudent pathway to follow. Alternative assessment techniques do have their place. But remember, a task alone does not constitute an assessment – we must have criteria to judge the performance or product.

REFERENCES

Teaching Games for Understanding:
Basketball Teachers’ Responses After Training

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Abstract
This study was designed to evaluate the feelings, perceptions and progress in implementing the teaching games for understanding approach among four PE teachers. A one-year follow-up interview was used to investigate the effects of using the new approach on PE teachers who had participated in a workshop and teaching trial of basketball with 4 classes of 140 students. The results indicated that the advantages seemed to be related to the value for children and the disadvantages seemed to center around the problems for teachers. All teachers reported that they had changed their approach to games teaching and recognized the value of the approach for the children. However, the concern about how much skill technique was learned remained. Teachers noted the need for more information.

INTRODUCTION

The teaching games for understanding movement is an innovation in games teaching developed at Loughborough University during the ‘70s. This approach puts the emphasis on the understanding of games and the development of cognitive experiences, but was designed first and foremost to overcome some of the inherent ‘motivational’ problems associated with a ‘typical’ skill-based approach. Through the teaching and training of teachers in Hong Kong, the author saw the same problems existed as those identified and reported by Bunker and Thorpe (1982) when introducing the model. The approach has been investigated in various countries throughout the world, most notably in Europe and the USA in teaching situations, and in Australia in both a teaching and coaching situation. The fact that others (e.g., O’Boyle, 1995) noted the value of the approach for mixed ability classes was particularly pertinent to the Hong Kong situation. As early as 1985, Stoddart, a secondary PE teacher in the United Kingdom, noted that his students seemed to be enjoying the teaching games for understanding approach far more than the skill-based approach. However, the majority of research from Booth (1983) and Lawton (1989) in the United Kingdom, as well as a variety of authors in the USA in the ‘90s, concentrated on what was learned in the teaching games for understanding approach, rather than how teachers and students enjoyed and valued the approach.

Some physical educators are convinced that the teaching games for understanding is a far more appropriate way of teaching mixed ability groups in the school situation, and others recognize that it is, at the very least, a valuable addition to the games curriculum. Despite considerable international publicity, the author noted a dearth of knowledge in Hong Kong.
Indeed it was the author's opinion that there was an unquestioning acceptance of the 'traditional skill-based' games lesson. If this opinion is confirmed it would seem desirable to introduce the ideas embraced in the teaching games for understanding approach if only to prompt a more reflective climate. Hong Kong would appear to provide a challenge for the approach in that games teaching is not only technique based, but teaching is quite didactic (Curriculum Development Institute, PE Syllabus, 1995). The author realized that the evidence about skill and tactical improvements could be presented to teachers, but recognized that change and acceptance would only occur if the teachers and pupils were to feel comfortable in this new learning environment, in their own 'particular' circumstances. It was the 'motivational' aspects that interested the author.

The present study is part of an on-going investigation in Hong Kong. Four PE teacher (2 males and 2 females) taught basketball. Two teachers were categorized as experienced (6-7 years teaching experience) and two were inexperienced (1-2 years teaching experience). Four classes of 140 students were taught with two different approaches, the skill-based approach and the teaching games for understanding approach. In order to minimize the influence of extraneous factors, the teaching trial for both approaches consisted of eight lessons based upon sets of lesson plans provided by the author. Before the teaching trial commenced, a two-day workshop was organized to explain the philosophy and rationale of the teaching games for understanding approach as well as to demonstrate a lesson taught using this method. A questionnaire was used to collect feedback from the participating teachers, thereby enabling comparisons to be made on the feelings and enjoyment regarding the two different approaches. The findings indicated that both the teachers and students felt comfortable and enjoyed the teaching games for understanding approach despite relatively little exposure.

Change is all around us and purposeful change is the new norm in teaching (Fullan, 1993). The impact of most teaching innovations, and certainly the teaching games for understanding, has been assessed over short periods. A follow-up interview was specially designed to study the influence of the new approach on the four PE teachers after one year of teaching.

The follow-up interview was conducted with the original four PE teachers who participated in the workshop and the teaching trial. The objective of the study was to investigate the four PE teachers’ feelings towards, perception of, and progress in implementation, of the teaching games for understanding approach, together with the problems faced throughout the year.

METHOD

After attending the workshop and one year of teaching, the four PE teachers were again invited to undergo a follow-up, face-to-face interview, to study their feelings and progress on the teaching games for understanding. The interview was conducted in three parts: the opening, the topical section, and the closing (Schwartz & Jacobs, 1979; Gilbert, 1993). There were six structured questions with probes provided for the interview. All the responses were tape-recorded to ensure that the information was collected exactly as given. After the interview, the field notes transcribed from the tapes were written within three days to minimize the period between data collection and data storing, and to reflect on the data before commencing the next interview. Based on Bogdan and Biklen's (1992) suggestion of different categories for coding qualitative data, the teachers’ responses from
the follow-up interviews were coded within three different categories: (1) process codes, (2) perspectives codes, and (3) event codes.

RESULTS

1. In what way do you feel this approach to games teaching has influenced you?

All four teachers reported changes in their games lessons after the workshop because, they said, they thought the teaching games for understanding approach was refreshing, stimulating, and beneficial to students. In one case, the change was significant. The other three teachers replied that they had made slight changes, but that they sometimes taught using a technique focus. The main reason they gave for 'only a slight change' was their limited knowledge about this new approach and their fear of poor class discipline during the lesson.

2. Can you identify ways in which the teaching games for understanding has influenced your games teaching general?

All teachers expressed that they had changed their teaching approach from the skill-based approach toward the teaching games for understanding approach. They placed the emphasis on games and tactics. Technique was no longer the only key element in a lesson. One interesting answer was recorded from the experienced male PE teacher who noted that he used the new approach selectively. He did not recommend teaching handball with this new approach because the passing was so fast that the ball would hurt students if it hit them. Clearly the idea of modifying the ball had not occurred to him.

All noted that the experience had made them think differently about the underlying concept of games teaching. Three of the participants indicated that they had a new and refreshing impression of games, tactics, techniques, and enjoyment of a lesson. They accepted the idea that the major elements in a game lesson were the game itself and the inherent tactics, while technique could play a supportive role. Consequently, enjoyment came from the game rather than the technique.

3. What are the good things of this approach (from a teacher's perspective and a student's perspective)?

Interestingly, each participating teacher listed quite different benefits for this new approach, such as: it was beneficial to students in terms of generating more enjoyment, it kept students more actively involved in the lesson, it gave a refreshing and stimulating feeling, it helped students know how to play the game, etc. A particularly interesting benefit, noted by the experienced female PE teacher, was 'the opportunity to identify leadership among students'. She explained that during the game as well as while learning tactics, opportunities were given to students to discuss, to think, and to practice. Through this process, a few of the students who had leadership potential would take the lead in the discussion and practice.

From the student's perspective, the teachers suggested that the new approach could provide more satisfaction and enjoyment to students, with more opportunity to think. Unsolicited remarks from three out of the four PE teachers expressed the view that this new approach would enable students to learn according to their own abilities.
4. Do you see any weaknesses in this approach (from a teacher's perspective and a student's perspective)?

Three out of four PE teachers voiced their concern regarding poor class control during the lesson with this new approach. One of the inexperienced male PE teacher reflected that he was worried about the student's poor performance in the game because they learned less technique during the lesson. Clearly, these teachers perceive the disadvantages concerned with 'class management'. Whilst this has been noted in the 'Western' literature, it may be that the problem is more obvious in the 'Hong Kong - Chinese' education system.

The teachers noted two additional weaknesses. First, they were worried about students who might be in an inferior position in the game because the teaching games for understanding approach did not put sufficient emphasis on techniques. Secondly, they commented that students might also have a feeling of 'nothing being learnt' from the games lesson if techniques were not being taught. While the teaching games for understanding movement addresses both of these concerns, the teachers in this study were not, as yet, convinced.

5. What problems did you face?

The PE teachers reported different problems which they had faced within the year. The problems included: the inadequate provision of sports facilities and PE equipment, their limited knowledge of how to evaluate their own performance when using the teaching games for understanding, as well as how to assess students objectively.

Difficulties in class discipline were reiterated and the uncertainty as to how PE inspectors would view this new approach was noted. There were two common problems mentioned by all participating teachers. They commented forcibly that they had inadequate understanding of this new approach and they were also worried about the negative view from their headteacher, if this type of approach was not generally accepted.

These problems are understandable. Since the teaching games for understanding approach was new to Hong Kong, they could not access related information easily. Of course, to date, there is very little written in the Chinese language. In addition, one of the characteristics of this new approach was to encourage students to talk, to discuss, and to decide how to make appropriate responses during the lesson. It would give the impression to the outsider that the class was somewhat out of control, particularly when skill has been taught in a didactic way.

6. What kind of help do teachers need for this approach?

Similar to the previous question, different PE teachers suggested different kinds of help that they perceived as important, such as: providing an objective method to assess the students and promoting a positive impression of the new approach with the headteacher. However, all of them recognized that help should be given to PE teachers. This included the provision of more information of this new approach, such as lesson plans and handouts, as well as conducting demonstration lessons, workshops, seminars, and conferences. In addition, one experienced female PE teacher expressed concern that for a long-term purpose, a change to the PE games curriculum was needed. In addition, one inexperienced female teacher reflected that the best help was to incorporate the teaching games for understanding training in initial teacher training.
DISCUSSION

The results of this study indicated that teachers had received different influences from this new approach within the one year of time. With reference to last year's feedback from the workshop, it is interesting to learn that their beliefs in this new approach has not changed. The teachers still believe that the new approach is refreshing, stimulating, and beneficial to students. Although Butler (1996) expressed the view that there was no definite correlation between the belief of the teacher and teaching approach, it may be one of the incentives that enables them to continue the practice of the teaching games for understanding approach. Their existing belief originated from a skill-based perspective and then began to change after the teaching games for understanding workshop. Apart from that, they expressed the view that they changed their teaching approach and concept of games teaching. From their responses, the teachers reflected that they started the lesson by teaching games, rules, and then followed with tactics. Techniques only played a minor role in the lesson. It is also encouraging to observe that there was a remarkable change in their perception of technique. Previously, the inexperienced PE teachers expressed the feeling during the first workshop that the new approach was not logical, as techniques were being placed in a minor role. At present, they have changed to the extent that three of the four have made significant changes and only one, at times, teaches technique as a separate unrelated element.

In response to the change in concept, it seems that after one year of practice, all of them have acquired a better understanding of the approach, particularly on the relationships between the game, tactics, techniques, and enjoyment. They are re-assured that more enjoyment can be generated for the mixed-ability students who can learn the game at their own pace. This is further supported by the next question.

To understand what the good things of the new approach are, the participating teachers reported the following:

1. Students can learn with more enjoyment.
2. Students can participate actively in the game.
3. Students can learn how to play the game.

The above findings reflect that they experienced and recognized the benefits of the new approach towards the students. In addition, it was interesting that one experienced female PE teacher pointed out that this new approach could help teachers identify student leadership. Although her idea has not been advocated or claimed by the Loughborough team, it must be accepted as one of the positive outcomes. Eventually, student leaders will be easily identified by teachers. Of course such a finding is related to 'empowerment' which is central to much of this work.

Concerning the weaknesses of the new approach, three out of four PE teachers pointed out that when compared with the skill-based approach, the teaching games for understanding approach created a poor class management situation. Similar findings were also reported by Butler (1996) who studied teacher's responses to the teaching games for understanding. Their reflection on poor class control was expected because the new approach provides a change in focus from order, control, and teacher-centered interactions, to a focus on student understanding through problem-solving and exploration set by the teacher.
Another weakness expressed by one inexperienced male PE teacher was that the new approach would hamper the technical development and performance of students in the game. To overcome this weakness, he suggested teaching some techniques before the game. Incidentally, his concern is also similar to Butler's (1996) observation that "students need to learn skills before they can play the game". Interestingly, this particular teacher indicated that he had made significant changes within this year, despite his present view on the weakness of the new approach. It seems that he may probably misunderstand the role of technique in the new approach. Perhaps, he may have thought that technique is the 'devil' of the new approach, thus believing that one never teaches technique in the teaching games for understanding approach. If this assumption is correct, he has misinterpreted, like some PE teachers in England, the early work of Bunker and Thorpe (1986). There is no doubt that his misunderstanding comes from a limited knowledge of the new approach in Hong Kong. This point reflects that information about teaching games for understanding is inadequate in Hong Kong. Further evidence to support and verify such inadequacy of information can be echoed in the next question.

All four PE teachers expressed the feeling that students might have an inferior position in techniques and have a feeling of learning very little in the lesson. It is true that the new approach puts students who are familiar with the skill-based approach at a disadvantage because the focus of the lesson has been changed from executing techniques to understanding tactics (Butler, 1996). It is reasonable to expect that students cannot play as well as before, in terms of prescribed technical performance. However, it must be reiterated that the emphasis of the teaching games for understanding is on enjoyment, tactical understanding, and on evoking motivation to want to further learn skills (Bunker & Thorpe, 1986).

While the teachers perceived that students felt that little learning occurred in the games for understanding approach, it is understandable that students would have such a belief since they have experienced a sudden change from the traditional skills-based approach to teaching they have known since their primary education. The students are already accustomed to the skills-based approach and learning techniques cannot be segregated from games lesson. In fact, it may arrive at a circumstance that it is unacceptable, such as bread without butter. It is, therefore, inappropriate to expect them to change suddenly in a way to accept a new approach without emphasis on techniques. As a result, a technique element in a lesson may generate a feeling of nothing to learn.

Regarding the problems they faced, the teachers expressed a variety of different concerns as listed below:

1. Inadequate information and teaching materials.
2. Inadequate provision of sports grounds and PE equipment.
4. Incapable of assessing students objectively.
5. Incapable of managing poor class control.
6. Uncertain view of PE inspectors.
7. Negative impression of the new approach from the headteacher.

Interestingly, it is possible to observe from the previous items that their perspectives and concerns have become wider after one year of teaching. Previously, after the workshop, their concerns were limited to the inadequate provision of sports grounds and PE equipment as well as inappropriate assessment methods. However, after one year of
Teaching Games for Understanding: Basketball Teachers’ Responses After Training

teaching they have become aware of more problems with assessment, poor class control, the uncertain view of PE inspectors and headteachers, which are extremely fundamental and crucial. Note that the concerns are not about the children, but more about class management skills. It is encouraging to hear their concerns, because the more the concerns, the better the understanding of the new approach. Ultimately, their concerns will facilitate the smoothness of the introduction of the new approach in Hong Kong.

One crucial problem, however, concerns the negative view of the headteacher and warrants further attention. All four teachers raised this issue. Their concern is about the change of teaching approach to games lessons. This change will lead to poor class control. They reflected that such change would likely result in a negative impression from the headteacher regarding their teaching performance. This negative impression would have a gradual adverse effect on their teaching career, and even job security. It is really a practical problem for teachers. The key issue here is that the headteacher has an impression that students must be taught properly and orderly in a games lesson and a PE teacher must teach techniques. Such an impression comes from a games lesson taught using the skills-based approach. Subsequently, this impression will become a yardstick to assess a teacher’s ability to teach. However, this is not a real issue for the teaching games for understanding approach. As discussed by Butler (1996), a teacher may have less control of students in the new approach. Since the headteacher does not understand the characteristics of this new approach, a negative impression will gradually be generated. Consequently, although teachers may have a positive attitude towards the new approach, they may not practice it in the game lessons. To overcome their worry, they were asked to make some suggestions. They proposed that the best way was to introduce the new approach to their headteachers by themselves, together with PE inspectors. This is thought to be a direct and effective solution. As the approach is based on sound educational evidence, it should not be difficult to convince the headteacher.

To understand the help offered to PE teachers, they discussed a number of concerns that were mainly related to the problems they had faced previously. One interesting suggestion by two experienced PE teachers was the need to change the PE curriculum, rather than just see this as a change in teaching approach. In the long run, their suggestion is a ‘must’. To implement the new approach successfully, the change of games curriculum is the fundamental task to be achieved. The main reason for that change is because teachers can use it as a reference and back-up to implement teaching games for understanding effectively, as well as to change their philosophy on games teaching.

CONCLUSION

Like other authors, the findings of this study indicated that the advantages seem to be related to values for the children. The disadvantages seem to center around the problems for teachers, with the exception of an understandable concern about how much technique is learned. Interestingly, all of the teachers recognized the value of the approach and desired more information and support. A broader form of assessment and evaluation of the teaching games for understanding approach in Hong Kong could be used. Finally, it is recommended that more research work on other sport activities should be conducted in the future.
REFERENCES


Outsourcing: An Innovative Strategy for Enhancing Physical Education in the Schools

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Abstract
Siekatop (1992) has encouraged physical educators to think “out of the box” as a way of improving educational programs. He suggests that educators should think about time schedules, program experiences, promoting independent learning, and making participation and learning fun. Physical educators are challenged to provide programs to counter a steady slide in support of physical education resulting in increased obesity and lower fitness levels in children, youth, and adults. This paper proposes utilization of the management concept of outsourcing as a way of improving the delivery of physical education. Outsourcing can be thought of as a management concept in which an organization acquires services from an outside provider. A challenge confronting physical educators is to encourage students to pursue an active, vigorous, and healthy lifestyle throughout their lives. Often there is a disconnect between what is learned in the school setting and what is practiced in community life. A curriculum, employing outsourcing, provides senior students with opportunities to engage in self-directed physical activities in community settings under the supervision of faculty. The curriculum engages students in a minimum of five hours of physical activity on at least three days of the week and employs reflective logbooks, detailing workouts and perceptions. Students meet with faculty bi-monthly to review goals.

OVERVIEW
Physical Education is an important element of the overall educational process. An important goal of physical education is to encourage individuals to pursue an active, vigorous, and healthy lifestyle. Over the past several decades we have witnessed changes in the organization of physical education curriculum in some schools attempting to keep pace with a rapidly changing society and culture. In other schools, programs are still very traditional with sport activities being the primary focus. In a progressive society, the possibilities, needs, and interests change. There are increasingly many new and innovative forms of movement that appeal to individuals of all ages. It is the responsibility of the educational institutions to keep abreast of these changes and design a curriculum to meet the challenges of the era.

While the NASPE Standards Project (1995) has clarified the goals of physical education in America and the Surgeon General's Report (1996) has reinforced the need to keep
adolescents and young adults active, we continue to observe a steady slide in the support of physical education in the schools. The support of parents, administrators, and the public in general has weakened for the continuation of physical education as an important part of the overall educational process in schools. As Siedentop (1992) indicates "at a time in American culture when sport, fitness, and physically active leisure experiences are increasingly valued, school physical education is so often devalued, generally lacking in credibility within the secondary school culture, and often ridiculed by those outside the school". This is further evidenced by the declining enrollment in secondary physical education from 42% in 1991 to 25% in 1995 as noted in the Surgeon General's Report. It appears that this declining support for physical education is due to a lack of awareness of the importance of physical education in the schools. This problem has led to the reduction, cutting, downswing, and/or downgrading of physical education in many school districts across America.

A lack of support for physical education has resulted in larger classes, higher student-teacher ratios, congested facilities, overworked physical education instructors, and indeed frustrated students. Insufficient funding, poor support, lack of innovative programs, and lack of appreciation for the value of physical education has led to negative attitudes and as a result discouraged teachers in ways that have further complicated the physical education dilemma.

SEEKING INNOVATIVE SOLUTIONS

The search for effective solutions to the de-emphasis of physical education in the schools is seemingly a never-ending process. The most obvious solution, gaining the support and confidence of parents, administrators, and the public, seems to be as elusive as the myth of Sisyphus. In Greek mythology the greedy king of Corinth, Sisyphus was doomed forever to roll a heavy stone up a hill, only to have it always roll down the other side. The work of physical educators in trying to influence others of the value and importance of our area is much the same. We push our values up an incline to the top of the peak of the organization, only to have the challenge of making points of the importance of our work presented to us again, again, and again.

Physical education programs have over the years been effectively formatted to parallel the growth and developmental needs of individuals. Curriculums have been designed that are not only age appropriate in terms of growth and development, but also in terms of individual needs. Programs have been organized in such a way to encourage individuals to pursue a healthy and active lifestyle, including the teaching of many lifetime leisure skills. Physical education curriculums have been uniquely organized to meet the needs of children and youth at the elementary, junior high, and high school levels. This has been especially true in the elementary and junior high schools. Because of the number of sport opportunities outside the school setting many students are coming to school at younger ages with more physical skills. This has led to a lowering of the age at which many sport activities are provided in the schools. Such a movement in the curriculum demands new directions in secondary physical education.

At the elementary school level physical education programs are often organized to aid in a child's growth and development as well as developing greater physical and environmental awareness. Movement education, low organized or structured games, rhythmic experiences and other activities that lead to the learning of sport skills are all a part of the curriculum for elementary school-age children. Instructional emphasis is on a variety of activities and
a breadth of activities. Students explore the myriad activities available in a relatively brief unit. In junior high, individuals are exposed to a variety of sports and other activities that help promote interest and explore one’s potential. Many junior high curriculums embrace the idea that skillful performance is a valid assumption and can be a focus of the junior high school physical education curriculum. Variety is still a keyword in the curriculum. Instruction emphasizes proper skill technique and lead-up games ensure greater success. Many high school level physical education programs are moving toward promoting lifelong leisure development as well as wellness and other health related activities even though many programs are still very traditional in their offerings of multi-activity models. This is a time for specialization and competency. Units of instruction in high school should be consumer driven. Pangrazi and Corbin (1995) indicate that a forward-thinking view is a high school curriculum seen as a comprehensive fitness and exercise club. Students choose activities to meet their needs and teachers use creative programs and activities to hold student interest. It is at the high school level that physical education has the greatest potential to impact the physical activity habits of today’s youth. Increasingly, outdoor pursuits, especially where geographically feasible are becoming important parts of the high school curriculum. The high school physical education should be focused on developing lifetime physical activity patterns, finding meaning in their movement experiences and assisting individuals ease the transition from school life to community living.

As one can deduce the focus of physical education curriculum is well developed at all levels and appears to be instinct with contemporary societal needs. Yet, there is still the problem of support, even though many physical education curriculums are well grounded having established sound goals and clear objectives. Perhaps the challenge, especially in high school, is in the organization and delivery of programs rather than in the mission of our efforts. Siedentop (1992) encourages educators to think differently about how we offer physical education and experiment with different formats. Siedentop goes on to suggest four guidelines that should underlie this change. He indicates that we must: (1) think differently about the time schedules for physical activity; (2) program experiences for long-term mastery; (3) help students move toward becoming responsible learners; and (4) ensure that while students are participating in sport and fitness it remains fun. Kretchmar (2000) notes that it is important for physical educators to rethink their work in such a way as to promote learning so that activity is perceived as being important and personally meaningful. Further, he has indicated that a reconceptualization of the role of the instructor, from skill instructor and health expert to activity broker is called for. The teacher would need to be a broker to a variety of experiences, many emphasizing student choice and responsibility, some involving out of school resources, others requiring collaboration with parents, and so on.

One of the most important and powerful management strategies evolving is the concept of outsourcing. While physical education may be seem as engaging in outsourcing at times when taking students to bowling alleys, swimming pools, and on field trips, there are much broader applications of this notion that can be used to facilitate physical education. This article focuses on the application of this concept to physical education programs. The discussion includes a case study supporting the sound application of outsourcing to the teaching of physical education as a strategy to enhance and perhaps even extricate the secondary program from its current dilemma of nonsupport.
WHAT IS OUTSOURCING?

Outsourcing is a contemporary management concept that emerged in the late 1980s. Basically, we can think of outsourcing as a process wherein an organization acquires a product or service from an outside supplier, provider, or vendor. Usually outsourcing involves making a decision to purchase a service that has previously been produced internally. In other words, it is a process for acquiring value by seeking individuals and/or organizations from outside to provide the service.

Outsourcing fundamentally challenges the way that individuals align and distribute resources within organizations. In the traditional model of organization, it was thought that the best way to plan, organize, implement, and evaluate services was to control and operate all of the resources required to provide a service. Outsourcing requires managers to think differently. As a management strategy outsourcing involves developing mutually beneficial long-term relationships with individuals and/or organizations that have the unique skills, expertise, or even qualities that can add value to the work of an organization.

Outsourcing should be viewed differently than the more traditional "contracting" for services. We often contracted with outside vendors as a way of enhancing cost-effectiveness and also time efficiency. Outsourcing on the other hand views an organization's resources as being more fluid and flexible. It is a management strategy that can be used to help an organization grow qualitatively and quantitatively by positioning its resources through partnerships with others. Such partnerships enable an organization in a sense to create a virtual network of resources that they don't own, yet utilize, that contributes to the overall quality, value, and excellence of the services they are providing.

The Advantages and Disadvantages of Outsourcing. As is the case with any program strategy, there are advantages and disadvantages. One needs to weigh carefully the pros and cons of outsourcing to determine whether or not it is an appropriate strategy that can be applied in the organization of physical education secondary curriculums. It is evident that there are numerous advantages to using outsourcing as a strategy. Some of the more obvious reasons include the following:

Program Innovation. Outsourcing provides opportunities for school systems to identify and secure the most current innovations and bring them to bearing in the design of a physical education curriculum. There is a great need for new and different strategies in organizing physical education curriculums. Outsourcing provides an opportunity for aggressive program innovation.

Quality of Services. By developing mutually beneficial relationships with other individuals and organizations a physical education program can take advantage of enhancing the quality of its services. For example, a curriculum operated in a high-quality commercial wellness facility might provide a more attractive environment to students and provide a better link to community resources.

Budget Control and Ease of Accounting. Outsourcing usually involves transferring the responsibility for high-cost fringe benefits to the organization with which a contract is developed. Rather than multiple accounting or financial transactions, there is usually only one.
Outsourcing: An Innovative Strategy for Enhancing Physical Education in the Schools

Access to High-Quality Personnel. Outsourcing provides the opportunity to seek the highest quality personnel or instruction for programs. Often, new program designs require retooling or retrofitting of faculty. In this fashion, high-quality and knowledgeable individuals can be engaged immediately to implement programs of contemporary interest.

Greater Planning and Control. Outsourcing requires a need for planning and the proper definition of requirements. It also requires that individuals focus on assessing the outcomes. As a result, planning and control are enhanced based on specialization, expertise, and on excellence.

Positive Public Relations. Taxpayers view outsourcing as an efficient way of operating government tax supported operations. In many respects, it creates positive public relations because it engages community members, especially business. Also, it is looked upon as an efficient way to operate an organization.

Fast Start-up. Outsourcing provides an opportunity to move an organization rapidly to meet new and changing conditions. The traditional bureaucracy can be bypassed as well as problems associated with attempting to promote change within an organization.

Potential Cost Reduction. Outsourcing does provide an opportunity to reduce the cost of operating an organization. However, if only viewed in this context, it delimits the potential of bringing to bear greater quality programs. One needs to be careful in trumpeting outsourcing mainly as a cost-effective activity without attention to issues related to improving quality, diversity, and growth.

As there are advantages, there are also disadvantages to using outsourcing. Experience has suggested that one of the most difficulty challenges in employing outsourcing as a strategy is helping employees within the organization understand the differences when curriculum, not necessarily planning and/or assessment, are transferred to another party. Some of the disadvantages that are often cited include:

Loss of Control of Curriculum Implementation. The loss of control of the implementation of a curriculum is often expressed as a great disadvantage of outsourcing. It is important to understand that the work of individuals change dramatically from a focus on implementation to that of planning and control. It is difficult at times to give up the hands-on work that physical education instructors have primarily seen as their responsibility.

Displacement of Employees. One of the great fears that exist within organizations among its employees is that if outsourcing is adopted as a basic strategy they would be displaced or replaced. Clearly, outsourcing calls for the creation of a core faculty that surrounds itself with temporary resources that are engaged on a contractual basis.

Philosophical Differences. There are often differences philosophically in terms of how programs are to be implemented. Pedagogical strategies, the way in which children and/or youth are engaged in the learning process, or even more broadly, ones philosophical beliefs regarding physical education may impact on a programs implementation.

Meshing Organizational Cultures. One of the most difficult challenges in integrating programs from one organization into another is that of meshing their organizational cultures together. Tax supported government organizations simply have a different mission than commercial enterprises or non-profit organizations.
Assessment and Accountability. It has been suggested that it is very difficult to engage in accurate assessment of program outcomes if control of the program implementation process is transferred to another party. Program accountability should be integrated with one another, although it could be argued that accountability is increased when a second party is involved in the assessment procedure.

In the educational arena outsourcing has been used to hire outside contractors to provide non-educational services, such as transportation, printing, and foodservice, primarily as a cost saving measure to the schools (Argon, 1997). Libraries have sought new methods of enhancing service to their clientele while still maintaining quality. They have been outsourcing tasks that were related to general facility management, but that did not require library skills (Schmidt, 1999). Outsourcing can be done for strategic reasons such as to provide for organizational flexibility and for tactical reasons such as providing access to resources not found in house. Both of these examples can apply to physical education.

Physical educators have long utilized outside services to enrich their programs and supplement their faculty inadequacies. They have used "Y" pools, bowling alleys, fitness clubs and other community facilities on occasions. Physical educators have also sought the assistance of outside experts to compliment their instructional professional preparation, educators do not trust involving any other volunteers in their instructional responsibilities. This protective attitude is an admirable integrity of educators looking out for the welfare of students. The proposed outsourcing concept in this article does not compromise this concern.

Outsourcing: Toward a Solution for Improving Physical Education at the Upper Secondary Level

The idea of outsourcing can be effectively applied to improving physical education at the upper secondary levels. The major purpose for employing outsourcing as a strategic curriculum mechanism at the upper secondary level is to help students make the transition from the school setting into the "real world of lifelong activity." In other words, outsourcing may be effectively applied at easing the transition from school life to community life. If physical education programs are to be successful in promoting lifelong fitness and leisure activities; then program services and settings within which these activities are offered should reflect as closely as possible the environments in which individuals will participate after they leave school settings.

The idea of outsourcing as used in this concept paper is not so much an attempt to save money, but to provide a way to enable the provision of physical education experiences in a more flexible manner, by using community resources. Further, it may be that by using community recreation wellness facilities schools could save funds and employ their fiscal resources in a different manner. In the proposed concept we believe that it is important for there to be involvement of physical education teachers in the implementation of the curriculum. In this way, the outsourcing effort is focused on using community based resources and enables continued control of the educational experience by physical education faculty. It may be that there are resources or experts in the community that can teach effectively. However, there are often other more salient pedagogical goals to be sought in the learning experience. By using the idea of outsourcing schools can provide opportunities to students that are meaningful, yet can not be provided by schools.
Outsourcing: Easing the Transition to Community Life

Again, the major focus of this concept is one of the proper utilization of community resources to facilitate the transitional process for students from school life to community life. Increasingly, physical educators are challenged to introduce activities that are not redundant and motivate students for full participation, especially for students in their last two years of high school. It is at this time that activities that have lifelong value are often introduced in the basic physical education curriculum and students encouraged to take a more active interest in maintaining their own personal well being. As the authors envision designing a curriculum that would incorporate outsourcing strategically the junior year would be a way of preparing students so that they can operate in a more responsible, independent and integrated fashion with community resources. This would involve not only preparing students with appropriate skills matched to community resources, but also helping them to develop attitudes and values that reflect mature, self-reliant and independent adult type behaviors required for full participation in community life. In one's senior year the curriculum would be designed so that students engaged in activities outside of the school settings under the guidance of physical educators.

The outsourcing idea as proposed here would allow senior students for one semester or longer to engage in physical activities outside of the school setting. The junior year would provide content and experiences that would enable students to be self-directed in their choices of activities and in their scheduling of activity. Students would not have to schedule activity during school time, which is often not convenient, but rather on their own time. Students, with the aid of the physical education faculty, would select activities, which meet their needs and interests in which to engage during the semester away from school. This should contribute to the enjoyment of remaining physically active, which we know increases participation. Students would complete logbooks including reflection on accomplishment of goals during the program, teachers would observe participation periodically, and students would be responsible for supplying information to the faculty member about their experience.

Such a curriculum could be established using the following program design:

1. Students are participating in designing their 5 hours a week at least on three occasions, engaging in physical activity outside the school.
2. Students could choose their days, time and type of participation and share it with their physical educators. This written program should be binding, any deviations from it should receive clearance from the physical education teacher.
3. Athletes who are active more than 5 hours a week can be excused from this participation only during the in season training and competition. As soon as their season is over they should be responsible for their wellness participation.
4. Students would be responsible for their own transportation, equipment and other incidentals.
5. A selected number of community units that have facilities could be approached and participate in providing facilities to the future customers of their own community. These arrangements can vary in various communities.
6. Students are required to meet at school every 2 to 3 weeks for an hour and share, revise, affirm and receive approval for further participation.
7. This program is not suitable for every school. Small schools without community facilities are not suitable candidates.
8. Physical education teachers should supervise the experience and be involved in the design and implementation of the program.
9. There should be many forms developed to facilitate the smooth operation of this experience.
10. There should be some sort of checking procedure designed with the community unit to control the accuracy of information.

**Benefits of Outsourcing Upper Secondary Physical Education.** This concept is dependent on building partnerships with recreational and wellness facilities within the community. It is believed that these partnerships will benefit the students, the schools, the physical education teachers, the recreational and wellness facilities and the community.

**Increasing Opportunities for Students.** Students will benefit because they will be engaging in activities that they can do for a lifetime. Under the guidelines students will participate five (5) hours at least three times per week at a time they select and in an activity they enjoy and meets their individual needs. Students will be able to participate in activities that require facilities that differ from high school gymnasiums which are typically built for athletics. Students will also become more responsible for their own learning and wellness status. Student athletes will be exempt while in season, but as soon as the season finishes they are required to join the program.

**Improving School/Community Relations.** Schools will benefit because this program will contribute positively to the school-community relations and help foster the transition of students to become productive members of the community and society. The school will gain access to facilities helping make classes smaller and programs better and will not be forced into providing as many wellness type facilities at the school because they will be accessible in the community.

**Enhancing Mentoring Opportunities for Physical Education Teachers.** Physical education teachers will serve in a mentoring role with students being involved in activity throughout the community. The relationship between teachers and students will rise to a new height and dimension. Teachers will also be able to be more effective because class size will be decreased in the other classes in the school.

**Promoting Community Facility Utilization.** The recreation and wellness facilities will benefit because they will have more people using the facilities and be identifying many new potential members. The usage of such facilities should grow once these students enter the community and continue participation.

**Encouraging Active Community Participation.** The community will gain because senior students will begin to become active member of the community. Students will learn the appropriate roles of engaging in adult exercise behavior within the community.

**SUMMARY**

An important goal of physical education is to encourage individuals to pursue an active, vigorous, and healthy lifestyle and as physical educators we must consider how to best influence student lifestyles so they are active adults. This concept paper proposes utilization of the management strategy of outsourcing as a way to improve the delivery, relationship, and hands on experience of students to facilitate the transition from an educational institution to community living. By giving students opportunities to plan and
implement programs and make physical activity a part of their lifestyle, rather than a class, hopefully they will continue to be active throughout their lives. A curriculum employing outsourcing, provides senior level students with opportunities in self-directed physical activities in community settings under the supervision of faculty. The curriculum engages students in a minimum of 5 hours per week of physical activity on a minimum of three days per week and employs reflective logbooks, detailing workouts and perceptions. Outsourcing Senior level physical education is an innovative idea to increase the likelihood that students will make physical activity a part of their everyday life. There needs to be a researched pilot study to explore the drawbacks, feasibility, and best method of implementation of such a concept. The authors are in the process of designing such a study.

REFERENCES


Improving Student Teaching Experience in Physical Education: An Analysis of Pre-service Teachers’ Perspective About Student Teaching

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Abstract

Scholars and researchers in education have considered student teaching as one of the most important areas of undergraduate teacher preparation. It is in student teaching that pre-service teachers practice skills of teaching and learn to design and implement curricular activities, and to get along with students of varying physical abilities and cultural differences. A continuing concern for teacher educators is how to improve effectiveness of student teaching. Reflections on student teaching experiences are important to consider in trying to understand and improve student teaching practice. Thus, an interpretive perspective guided the study. The purpose of this study was to investigate pre-service teachers' reflections on student teaching experiences. A questionnaire was developed and pilot-tested with 10% of pre-service teachers the previous year. The subjects of the study were forty pre-service teachers in physical education at a northern state university in the United States. Data were analyzed with constant comparison and 0.90 reliability was reached with the authors. A finding of the study is that the majority of pre-service teachers (60.7% of total) learned class management and discipline techniques. In contrast, a small portion of the pre-service teachers (17.0% of total) developed teaching-related skills. Another finding is that the pre-service teachers' field teaching experiences were not enough or lacking in their undergraduate program, which resulted in "reality shock" and inadequacy in transition from possession of declarative knowledge to application of procedural knowledge in the field. The pre-service teachers suggested that, instead of the program focusing on the performance, the activity classes should focus on how to teach various specific sport skills. A concluding remark is that a well-supervised and teaching-centered early field experience could provide pre-service teachers with an environment in which they could concentrate on developing actual skills of teaching and other aspects of teaching in public school physical education.

Student teaching is considered to be the most significant section of undergraduate teacher preparation programs (Brimfield & Leonard, 1983; Dodds, 1985, 1989; Haring & Nelson, 1980; Mitchell & Schwager, 1993; O'Sullivan, 1990; Paese, 1984a; Schempp, 1989). In physical education, student teaching provides pre-service teachers with opportunities and experiences to work with pupils, school faculty members, administrators and staff members in various school settings. Student teaching also provides pre-service teachers with opportunities to evaluate the extent to which they possess or lack teaching-related abilities and skills, and indicate the extent to which undergraduate preparation programs meet their needs (Alexander, 1982).
In many instances during student teaching, pre-service teachers develop teaching related abilities and skills (Ojeme, 1984). These include planning lessons, communicating content information to students, developing class management and discipline techniques, learning new pedagogical skills and strategies, adapting instruction to meet different individual needs of students, and constructing ways to evaluate teaching and learning processes. In other situations, student teaching in physical education influences pre-service teachers to either confirm or question their career choices. While positive pupil reactions and positive feedback from cooperative teachers and other faculty members may confirm pre-service teachers’ career choices, some factors, such as off-task student behavior, off-task class behavior, and non-motivated pupils during lessons, may cause pre-service teachers to question their professional careers (Jones, 1992).

The focus of this study was to generate data about what student teachers consider when asked to reflect on their student teaching experiences. Thus, the purpose of the study was twofold. First was to document what student teachers learned from their student teaching experiences and second, to elicit suggestions for reforming Physical Education Teacher Education (PETE) programs of similar background.

METHOD

The researcher-generated questionnaire was used as an instrument in the study. The questionnaire was designed to elicit responses from the participants regarding what they learned from their student teaching experiences and to solicit suggestions for improving their undergraduate program. The questionnaire was pilot tested with 10% (20 students) of the pre-service teachers the previous year. Following this, a final questionnaire was developed and this was used in the study. The following questions were used: (1) What skills have you developed while teaching at this level? (2) In what areas of your undergraduate preparation did you feel lacking? Any suggestions as to what can be done to improve the teacher education preparation program? (3) What advice do you have for those interested in student teaching?

The participants of this study were 40 pre-service teachers in their fourth year and final semester in the physical education department at a medium-sized university in the northeastern part of the United States. The participants’ field teaching experiences were limited to a four-week early field experience where the students taught at suburban high school, as part of a secondary methods class. At the time of the data collection, the pre-service teachers had just finished the first half (8 weeks) of their student teaching experience. Twenty-five of them spent the first 8 weeks at elementary schools and fifteen at the secondary level. The 40 pre-service teachers completed the informed consent forms and then they were given the questionnaire to complete. They were required to answer the questions based on their student teaching experiences at their assigned school levels. Consequently, twenty-five pre-service teachers responded to the questions based on their student teaching experiences at elementary schools. The other 15 answered the questions based on their teaching at secondary school level. This question-answer requirement was intentionally designed with the attempt to elicit the possible different answers from the subjects at different school levels (elementary or secondary school levels).

The data were analyzed with constant comparison (Glaser & Strauss, 1967). First, the data were organized alphabetically for each question. Then they were scanned for similarities and homogenous data were grouped into categories. Two investigators independently categorized the data and then a comparison was made between the two sets of categories.
Agreement between the two investigators was set at 90 and if there were any discrepancies, discussions were held to make sure that the categories used emerged directly from the data.

RESULTS

The participants responded to each of the questions accordingly. Because of differences in the nature on each question, the number of responses yielded from each question varied, ranging from 112 to 41. The total number of responses from the three questions was 203. The results will be presented in the order of questions.

Question 1: What have you learned while teaching at this level?

This question produced 74 and 38 responses from pre-service teachers who taught at elementary and secondary levels respectively. These responses fell into five similar categories with almost identical percentages (Table 1). Of the four categories, the first two (class management and discipline techniques) made up 55.4% and 71.1% of the total responses from the pre-service teachers at elementary and secondary levels respectively, which indicates that most of the respondents developed the skills in these two aspects of public school teaching.

Table 1: Category, Frequency, and Percentage of Responses to Question 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Elementary</th>
<th>Secondary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Class management</td>
<td>25</td>
<td>33.8</td>
<td>18</td>
</tr>
<tr>
<td>Discipline</td>
<td>16</td>
<td>21.6</td>
<td>9</td>
</tr>
<tr>
<td>Lesson planning</td>
<td>13</td>
<td>17.6</td>
<td>6</td>
</tr>
<tr>
<td>Teaching</td>
<td>13</td>
<td>17.6</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>9.5</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
<td>38</td>
</tr>
</tbody>
</table>

Based on the pre-service teachers’ responses, class management consisted of the following: keeping control of the class, managing time effectively, using various ways to group pupils in many different activities and drills, and utilizing effective transitional skills. In the section on discipline, the techniques used comprised of discipline tactics, and ways to handle and modify inappropriate behavior problems. In the teaching category, three sub-categories emerged. The first section consists of teaching skills and focus on ways to teach specific skills, to give clear and concise instructions, and to communicate key points and demonstrations. The next sub-category centers on teaching strategies. The pre-service teachers found that utilizing a variety of teaching styles, finding more than one way to teach any lesson, and adapting activities if they don't work as expected were critical skills to possess in student teaching. The third sub-category involves teaching students (motivation of students, maintaining students’ interests, and having better sense of student learning). The last category, other, contains virtues related to successful student teaching and they include cooperation, patience, and understanding.
Question 2: (a) In what areas of your undergraduate preparation did you feel lacking? and (b) do you have any suggestions for improving the teacher preparation program?

Altogether 50 responses (27 and 23 from elementary and secondary levels respectively) were received for question two. Although responses at the two school levels shared some similarities in category and priority, differences were evident. Table 2 provides a descriptive statistics regarding categories of responses to the first part of question two. Field experience was most frequently considered lacking in the pre-service teachers' undergraduate preparation. To the pre-service students, field experience includes actual teaching opportunities, more observation of teaching in the real world, and more early field experiences.

Table 2: Category, Percentage, and Percentage of Responses to Question 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Elementary</th>
<th>Secondary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Field experience</td>
<td>16</td>
<td>59.3</td>
<td>7</td>
</tr>
<tr>
<td>Pedagogical content knowledge</td>
<td>6</td>
<td>22.2</td>
<td>3</td>
</tr>
<tr>
<td>Lesson plan</td>
<td>3</td>
<td>11.1</td>
<td>3</td>
</tr>
<tr>
<td>Content knowledge</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Critiquing of lessons</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Discipline</td>
<td>1</td>
<td>3.7</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>3.7</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100</td>
<td>23</td>
</tr>
</tbody>
</table>

For instance, the pre-service indicated the following: “I feel that more time is needed with the field experience. Not only more time but with a wider range experiences”. "More practical experience in the field is needed. I personally feel my experience in the field is lacking”.

Pedagogical content knowledge, which consists mainly of teaching skills and strategies, was another aspect of teaching that the pre-service teachers considered lacking at both school levels. Accordingly, the pre-service teachers suggested that their undergraduate program needed to be adjusted to focus on how to teach rather than how to perform physical activities. For example, "We didn't do enough to prepare us to teach. It would be wise for our activity classes to be organized to prepare us to teach activities". The other two aspects of teaching mentioned by the pre-service teachers at both school levels were lesson plans and discipline techniques.

Although no pre-service teachers at the elementary school felt that they lacked content knowledge, more than seventeen percent of responses at secondary schools indicated a lack of knowledge in sport and game activities. The following are some of the examples: "Lack of knowledge in sport/game activities in our activity classes, we mostly played. I would like to have more activity classes into our degree”. Those who taught at the secondary school level also suggested that they need a class on critiquing of lessons as they felt unprepared: "My suggestion would be to have classes that deal with the critiquing of lessons". Apparently, content knowledge and critiquing of lessons seemed to be more demanded at the secondary school than at the elementary school.
Improving Student Teaching Experience in Physical Education: An Analysis of Pre-service Teacher’s Perspective About Student Teaching

Question 3: What advice do you have for those interested in student teaching?

Twenty-six and 15 responses were received for question seven regarding subjects elementary and secondary levels respectively (Table 3). The biggest portion of responses at both school levels were concrete suggestions, which were dependent on different individual’s unique experience in student teaching. As a result, these suggestions were diverse in content, from necessary modifications to planned lessons, development of appropriate ways to discipline, construction of supportive relationships with the faculty members, and establishing rules and expectations at the first class. Although diverse, these suggestions are all informative and useful.

Table 3: Categories and Percentage of Responses to Question 3

<table>
<thead>
<tr>
<th>Category</th>
<th>Elementary</th>
<th>Secondary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Concrete suggestion</td>
<td>11</td>
<td>42.3</td>
<td>7</td>
</tr>
<tr>
<td>Attitude</td>
<td>6</td>
<td>23.1</td>
<td>5</td>
</tr>
<tr>
<td>Encouragement</td>
<td>6</td>
<td>23.1</td>
<td>1</td>
</tr>
<tr>
<td>Expectation</td>
<td>3</td>
<td>11.5</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100</td>
<td>15</td>
</tr>
</tbody>
</table>

The second frequent advice made regarding both school levels were attitude that future pre-service teachers should have about their student teaching. In fact, the advice for attitude and concrete suggestion usually occurred together. The following quote provides a combined example of these two categories. "Be positive and enthusiastic, keep things new, and observe as much as possible before you decide for sure". The encouragement that came mainly from the elementary level was, "Go for it! Even though it can be difficult at times it is an extremely enjoyable and rewarding experience", and "Never give up! Some days may seem to be very hard, stick with it and always give 100%".

The next category is expectation for student teaching, which could be used to help future pre-service teachers understand different situations in student teaching and set their own expectations. The examples of expectation are "they (future student teachers) should go in not knowing what to expect. Every experience is different", and "be prepared to be busy and it is a lot of work. But it is very rewarding". No matter what kind of advice the pre-service teachers provided, these forms of advice are the knowledge directly acquired from their student teaching experiences and could be very useful for future pre-service teachers.

DISCUSSION

Examination of responses from the pre-service teachers’ reflections on student teaching experiences indicated that they learned mostly skills of class management and techniques of discipline (55.4% and 71.1% elementary and secondary respectively). These results are consistent with the literature regarding physical education student teacher’s priority in management and class control (Arrighi & Young, 1987; Book, Byers, & Freeman, 1983; Bell, Barrett, & Allison, 1985; Housner & Rink, 1983; Placek & Dodds, 1988; Schempp, 1985, 1988). In reference to this study, class management and control appears at the top of the concerns raised by the pre-service teachers. Apparently, class management and control is much more difficult in physical education class as students occupy and move around in
big areas of study than in regular classroom where students sit largely in confined areas indoors. Without the order in a physical education class, instruction and learning can not take place. Further, class rules and order should be established at the beginning stage of teaching or student behaviors (talking, reckless behavior in the gym, and failure to follow teacher’s instructions) will increase and class climate will become chaotic (Soar & Soar, 1979). It is quite reasonable to infer that during the first eight weeks of their student teaching, the pre-service teachers put most of their energy on class management and control which is understandable as class management and control is the premise of instruction and student learning (Hollingsworth, 1989; Sebren, 1995).

Consistent with pre-service teachers ideas on field teaching, beginning teachers’ also consider class management and control as chief factors in teaching. In a review of research on the perceived problems of beginning teachers by Veeneman (1984), classroom discipline was identified as the most serious and consistent problem among beginning teachers. Indeed, studies of teacher induction revealed that beginning teachers’ top concern to be class management (Bullough, Knowles, & Crow, 1989; Huberman, 1989). The pre-service teachers’ ability to control and manage classes has to be acquired not only through reading textbooks and attending lectures, but more importantly through several field teaching practices. In the context of this study, the pre-service teachers developed their classroom management and control abilities first before developing technical teaching skills and strategies. The pre-service teachers mentioned little information on pupil or student learning as one of their top concerns or as an indicator of successful/non-successful class occurrence. School officials and scholars (Placek & Dodds, 1988) think that there should be tangible evidence on student learning, and that pre-service teachers should be taught to hold students accountable for their learning. However, the impact of teaching on pupils becomes evident and dominant at a later stage as stated by Fuller, Persons, and Watkin (1974) in their four-phase developmental theory of teacher concerns.

The second purpose of the present study was to gather suggestions regarding improvement of undergraduate teacher preparation program and future student teachers based on the participants’ student teaching experiences. The pre-service teachers considered field experience as lacking in their undergraduate teacher education program. They indicated that they had limited early field teaching experiences. When they were exposed to actual teaching in clinical situations, some of them experienced “reality shock”, as they found that the real world was somewhat different from what they thought. This reality shock included large class sizes, limited space for teaching, and short teaching time.

The literature suggests that some kind of early field experience, which is quite different from student teaching in many aspects, could serve as effective instrument for instituting clinical situations for pre-service teacher to develop the techniques of teaching or procedural knowledge in physical education (Curtner-Smith, 1996; O’Sullivan & Tsangaridou, 1992). These early field experiences may be included in or combined with all the theoretical method courses that deal with physical education pedagogy. The teaching should be filled with enough feedback and reflection on instruction, and university supervisors should monitor each pre-service teacher closely. Under such conditions, pre-service teachers are guided to focus not only on class management and control, but also on instructional skills and student learning. Consequently, pre-service teachers may be able to focus on achieving goals of lesson and student learning (O’Sullivan & Tsangaridou, 1992), and on teaching techniques related to student learning (Curtner-Smith, 1996).

Pedagogical content knowledge is another main aspect of student teaching that needed to be improved upon in undergraduate teacher education program as indicated from the
Improving Student Teaching Experience in Physical Education: An Analysis of Pre-service Teacher's Perspective About Student Teaching

results of this study. An additional finding in the present study was that the content knowledge and critiquing of lessons were considered only by the secondary school student teachers in this study as those elements missing in their undergraduate program. The frustration experienced by the pre-service teachers in developing teaching skills and exerting impact on student learning resulted in the participants' reflection on inadequate pedagogical content knowledge that they learned during their undergraduate teacher education preparation. In this aspect, the pre-service teachers thought the activity classes included in their undergraduate teacher program needed to be adjusted. Instead of the program focusing on the performance, the activity classes should focus on how to teach various specific sport skills. This suggestion is consistent with Tinning's (1992) notion that there is little use if a teacher can only perform an activity but cannot articulate how it is done. Further, Tinning (1992) argued that the "essential knowledge for a physical education teacher is knowledge about (i.e., prepositional knowledge) how to perform a practical activity and the corresponding ways of organizing the graded progressive practices necessary to acquire the skill. Being able to also perform the skill might be a bonus but it is not a necessity" (p. 11). Since the pre-service teachers experienced limited early field experiences and that might have contributed to their lack of teaching skills and also may have made them to reason that they lacked pedagogical content knowledge.

CONCLUSION

This study confirmed that during student teaching, pre-service teachers have opportunities to develop class management and control skills, but have less chances to enhance technical skills and strategies of teaching, and show less concern on student learning during the initial period of student teaching. Indeed, student teaching provided pre-service teachers with opportunities to experience the reality of teaching physical education in public schools and to develop all-over teaching-related skills, especially skills of class management and control. It was apparent that the student teaching is more challenging in the secondary school than in the elementary school. This might due to the current and pervasive problems associated with secondary school physical education.

Early field experiences are beneficial to pre-service teachers if they are included in undergraduate teacher education programs. A well-supervised and teaching-centered early field experience could provide pre-service teachers with an environment in which they could concentrate on developing actual skills of teaching. Whereas student teaching is a period in which student teachers explore almost every aspect of the real world of public school physical education teaching, experiencing the "reality shock" and developing overall teaching-related abilities and strategies may best begin with early field teaching experiences in elementary and secondary schools. Indeed, shaping the future of the nation's work force in physical education may start with not only early induction into teaching but also a longer student teaching period.

REFERENCES


Jones, R. (1992). Student teachers: Incidents that lead them to confirm or question their career choice. Physical Educator, 49, 205-212.


College Students' Affective Reactions to Web-Based Instruction

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University of Akron, U.S.A.

Abstract
Using the Internet as a means of instruction as well as information resource for the purpose of learning creates tremendous impact on all levels of today's schools. As a result, educators have developed wave after wave of special classroom activities and collaborative projects based on the use of the Internet. Learners' attitude toward web-based instruction is unknown despite its importance to the learning process. The purpose of the current study was to examine students' attitude toward web-based instruction and their computer confidence after the experience of one semester web-based learning. Thirty-seven junior and senior undergraduate students (20 females and 17 males) majoring in physical education participated in the study. Quantitative and qualitative methods were used in data collection. Results indicated that the attitude score of the web group was significantly higher than that of the classroom group (p<0.01). The web-based group also scored higher significantly in computer confidence than the classroom group (p<0.01). In addition, 89.9% students from the web-based class and 66.7% students from the traditional classroom class were in favor of on-line instruction. One of the reasons was that students liked the flexibility of their own learning pace. The positive reception of web-based instruction from students indicated that students approved the new approach of teaching and learning. Positive attitude and computer confidence may be related to students' positive learning experience in the class.

Using the Internet as a means of instruction as well as information resource for the purpose of learning creates tremendous impact on all levels of today's schools. As a result, educators have developed wave after wave of special classroom activities and collaborative projects based on the use of the Internet (Windschilt, 1998; Robin & McNeil, 1997; Smeaton & Keogh, 1999). While we promote diversity of instructional strategies, web-based instruction can be a viable addition to the delivery of knowledge.

Online courses offered on campuses of higher education are based on the factors that first, computer technology offers tremendous opportunity for easy access of up-to-date and enormous amount of information sources, simplified software allow fast and more convenient communications. Second, as an alternative mode of course delivery emerges to the instructional stream, online instruction provides another major learning opportunity to fit students' learning styles. As Hederick (1993) indicated, we need to break with some of the sacred assumptions about the one best learning mode if we are to reengineer the teaching and learning process. Students learn in different styles, teaching and learning are dynamic processes that will benefit from diversity of pedagogical approaches. In addition, these nonclassroom alternatives may be the most effective means for realizing the various teaching objectives we claim to seek (Jaffee, 1997). Thirdly, online courses not only
provides opportunities for students on campus who are restrained by conflicts of schedules, but also reaches off-campus students who have other commitments that hold them from taking conventional classroom classes. As it was pointed out, the key economic advantage of distance learning over traditional on-site schooling is that it saves students time (Becker, 1999). Although web-based teachers and their students may be scattered all over the world, the Internet can help to overcome the disadvantages of physical separation. The online communication channels such as e-mail, chat rooms, and bulletin boards can reduce the feeling of isolation fostered by sitting alone in front of a computer. Because of these advantages, it was reported that nearly 400 accredited colleges and universities in North America currently employ online instruction, over 6,000 accredited courses were offered (Becker, 1999). The number is still growing every year. As students customize their online degrees by choosing courses offered by different colleges located all over the world, and more and more funds are generated to create virtual universities, the Colorado-based Jones International University became the first fully accredited entirely online university (Nicholas, 1999).

A few studies reported college students’ usage of computers. Sheffield (1998) studied the computer literacy skills of first year college students and found that most preservice teacher-education students reported only limited computer expertise. Furthermore, students exercised greater choice of when to study and experienced few problems of lack of access to computers or of technical failures. Web-based learning appeared to have saved students time and not to have involved them in much financial expenditure. In addition, learning on the web allowed students better access to information that is more up-to-date than is possible in a traditional university library. Online teaching gave students a greater input into their own learning process and making the process more pro-active; and it allowed a more individual approach to assessment and learning than is traditionally possible (Sloane, 1997). However, no study of physical education major students’ affective reactions toward web-based instruction was found.

Learners’ attitude toward web-based instruction is unknown despite its importance to the learning process. How students feel about the way they learn will have some degree of influence toward the learning outcomes. Finding out learners’ attitude toward the new learning method is one of the priorities facing researchers. Computer confidence directly relates to students’ learning behaviors in web-based class. High computer confidence may facilitate learning of a web-based course. Moreover, learning experience from a web-based course can also boost a learner’s computer confidence. For instance, using a network to communicate with each other may become a daily practice (Chen, Guo, Liu, Lee, Chen, Lin, Hou, & Hsieh, 1998).

The purpose of the current study was to examine students’ attitude toward web-based instruction and their computer confidence after the experience of one semester web-based learning.

METHOD

Sample

Thirty-seven junior and senior undergraduate students (20 females and 17 males) majoring in physical education participated in the study. The students enrolled in two sections of a 400 level required course, “Organization and administration of physical education,
intramural, and athletics. One section was selected as the web based class with 19 students and the other was the traditional classroom class with 18 students. The same instructor taught both settings.

Students were free to choose whether or not to participate in the study, which had no influence toward their final grades for the course. All of the students from the two classes chose to participate.

**Questionnaires and Course Conduct**

At the beginning of the semester, students were surveyed on computer confidence using a questionnaire that focused on students' confidence in using the computer. There were eight Likert questions on the questionnaire in which the participants responded by choosing 1 through 7 on the Likert scale from strongly disagree to strongly agree. Possible score was 56 points. Sample questions follow:

1. I am confident in my computer skills.
2. It is difficult to enjoy using a computer.
3. I have difficulty in understanding most technical matters.

Then the two groups of students were taught in two different instructional settings. For the web based instruction group, the students followed the pre-designed web course to perform individual and group work. The students were put into 4 groups for group projects. Each group also met with the instructor twice to present its project. The entire course contents were organized into 6 modules. Each module contained learning objectives, content of learning, reading assignment, related web sites, and student work, which included individual work, group project, and self-assessment. Deadlines were also posted for each assignment.

Textbook, electronic reserve, related web sites, and course web page were the major sources of learning materials. E-mail and a class bulletin board were the major communication routes. In addition, six classroom meetings were scheduled for necessary activities such as orientation, entire class role playing activities, and exams.

The traditional classroom class met three times a week for the entire semester. Lecture, questioning, individual work, group and class discussion were the major activities in the classroom.

With the same course contents, requirements toward the learning material for the two groups were also identical. At the end of the semester, during the last class meeting, the students filled out the questionnaires, including the attitude scale and the computer confidence scale. The attitude scale was a 14-question Likert scale. Students answered the questions by circle the numbers from 1 to 5, 1 as strongly disagree and 5 as strongly agree. Possible score was 70 points. Sample questions follow:

1. The way the class was organized made a valuable contribution toward student learning.
2. Student learning of the course content was effective.
3. The way the class was conducted makes learning interesting.
An open-ended question was also asked at the end of the questionnaire:

Please complete the sentence: I prefer this course to be taught as a (circle one) web/ classroom class because:

No participant identifying information was included on any of the surveys.

**Interview**

Seven students (4 females and 3 males) were interviewed at the end of the semester as to their opinions of the class. The interviews were conducted individually and dually. Notes were taken to record the conversations. Questions during the interview were focused on students' attitude toward the course instruction while comparing web based and classroom learning and their computer confidence.

**Other Data Collection**

E-mails and bulletin board postings were downloaded. The data were organized into categories. For instance, bulletin board postings were categorized into: Students' group discussion, group work, group communications, instructor's message to class. According to the nature of the content, the e-mails were categorized as follows: instructor's message to class, instructor to individual student, student to instructor, and student assignments.

**RESULTS**

Table 1 indicated that the attitude mean score of the web group (M = 55.37) is significantly higher than that of the classroom group (M = 44.89, p < 0.01).

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>T</th>
<th>DF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web</td>
<td>19</td>
<td>55.37</td>
<td>9.44</td>
<td></td>
<td></td>
<td>~0.01</td>
</tr>
<tr>
<td>Classroom</td>
<td>18</td>
<td>44.89</td>
<td>10.57</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While the first measure of computer confidence scores showed no significant difference, Table 2 indicated that there was a significant difference between the two groups at the end of the semester. The web group (M = 47.89) was significantly higher than the classroom group (M = 40.39, p < 0.01).

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>T</th>
<th>DF</th>
<th>P &lt; 0.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web</td>
<td>19</td>
<td>47.89</td>
<td>6.79</td>
<td></td>
<td></td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Classroom</td>
<td>18</td>
<td>40.39</td>
<td>8.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
College Students' Affective Reactions to Web-Based Instruction

Table 3 indicated that 78.4% of the surveyed students preferred web-based class while 21.6% preferred classroom class. In addition, 89.5% from the web group preferred web based class, only 10.5% of them preferred classroom class. In the classroom group, 66.7% preferred web-based class and 33.7% preferred classroom class.

**Table 3: Class Preference**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web</td>
<td>29</td>
<td>78.4</td>
<td>17(89.5%)</td>
<td>12(66.7%)</td>
</tr>
<tr>
<td>Classroom</td>
<td>8</td>
<td>21.6</td>
<td>2(10.5%)</td>
<td>6(33.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>100</td>
<td>19</td>
<td>18</td>
</tr>
</tbody>
</table>

From the web based group, the reasons for the preference of web based class were organized into five categories:

1. It allows me the flexibility to learn at my own pace (47.4%);
2. Promotes responsibility (21.1%);
3. It was new and interesting (10.5%);
4. It provides experience on the Internet (10.5%);
5. Promotes group interactions and communications (10.5%).

Interview results were as follows:

Student 1: “It's good to be on your own pace, I prefer the course continues as it is. Definitely it improved my computer skills.”

Student 2: “You get to prioritize your own work to meet the deadlines (of assignments). Good to work in group if you had responsible members. No need to lecture since contents are included in the book. It helped computer use, I prefer web.”

Student 3 and student 4: “Web is better. At your own pace, work at home, group easy to get together using Bulletin Board. It helped using computer.”

Student 5: “I like classroom class. Like to interact with people in the classroom. If I have a question, easy to ask classmates, teacher, easy to communicate. But it (web Class) did help using computer.

Student 6: “Yes, I like web class. I can work at home, weekends, and it helps using computer.”

Student 7: “Web class is better. I like group work and talk through computer.”

Of seven students interviewed, only one student preferred classroom class, all other six preferred web instruction after they had taken the web-based course for a semester.

Results from e-mail and bulletin board were as follows:

Postings on Bulletin Board
There were a total of 279 postings by students and the instructor.
E-mails
There were a total of 394 e-mails.

<table>
<thead>
<tr>
<th>Instructor’s message</th>
<th>Instructor to Individual Student</th>
<th>Student to Instructor</th>
<th>Student Assignment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>to class</td>
<td>51</td>
<td>68</td>
<td>268</td>
<td>394</td>
</tr>
</tbody>
</table>

DISCUSSION

The positive reception of web-based instruction indicated that students, who had previously been taught in tradition classrooms, approved of the new approach to teaching and learning. They found that learning via the computer was effective and accommodated their interest in the computer and the Internet. They felt release from trying to beat the clock on campus because of one class after another. A student might discover that, after all, I am not so bad in working in groups and talking to instructors. I could work collaboratively with group members online and communicate with my instructor comfortably through e-mails and bulletin board postings. Moreover, I did all these at home, during weekends, or on the trip with my basketball team with no worry about what I have missed for the class.

The more you use a computer, the more you learn about it. After one semester of using the computer online, students were much more confident in using computers. It seemed fear had gone, confusion had disappeared, and avoidance of using a computer was no longer a concern. Instead, confidence, assurance, and interest became commonplace. Taking a course helped a student not only learn something in a free way, but also improved his/her computer skills and helped to build up one’s confidence.

Positive attitude and computer confidence may be related to students’ positive learning experience in the class. In the book “The Dilemma of Inquiry and Learning,” Petrie (1981) emphasized the importance of mediation as a means of intervention between the student and the subject matter, as a way to guide the learning process toward particular outcomes, and connect a body of knowledge with a student’s cognitive framework. This could be a concern for a web-based course since no lecture was given by the instructor as it occurs in a conventional classroom setting. However, a well-designed and conducted web-based course should have the function to challenge students’ conceptual schemes. Ideas, reading materials, and concepts within a general theoretical framework could be situated through group discussions and projects, instructor’s synthesizing, interactions between students and the instructor, and students’ assignments. The results of 394 e-mails and 284 bulletin board postings from the current study suggested that communication, participation, and mediation were established. As stated by Jaffee (1997), “it is important to note that the response to class discussion questions in ALN (asynchronous learning network) course far exceeded—in both quantity and quality — anything I have experienced in a conventional classroom setting.” Different from classroom setting that a student usually answer a question from the top of his/her head, which was also one of the reasons of low levels of
class participation as reported by Karp and Yoels (1976), a student in web-based course would sit in front of a computer, with plenty of time to think and organize answers to questions. The student did not have to face the pressures from classmates, no nervousness, no shyness to speak in front of people, no fear to make mistakes. More importantly, the process of writing can be described as an emergent process in the sense that the translation of ideas into written prose often produces a clearer and more systematic understanding of the material (Jaffee, 1997). As a result, everyone in the class participated actively. Instead of only a few students dominating the discussion in the conventional classroom, everyone communicated to each other freely.

To ensure students' successful learning in the online class, the teaching process was designed to engage students in learning existed knowledge as well as in production of new knowledge, engage them in self-evaluation, reflection, simulation, and application of that knowledge. The modules of the course contents and the specific objectives of each module helped the convey of knowledge. The instructional design of activities, group and individual projects, self-assessments of each module, all followed a logical progression of step-by-step acquisition of conceptual framework needed to accomplish the learning objectives. The design of the learning tasks focused on the application of the knowledge to ensure deeper learning. Because when students are able to see a practical application of the knowledge, they are more motivated and they can more easily merge the new information with their previous experiences (Dewald, 1999).

Interactivity is what distinguishes an information source from a learning experience (Brandon, 1997). It contributes to learner motivation, aids learning by providing opportunity for students to practice skills, and allows for assessment of student understanding at the completion of the learning module (Dewald, 1999). When a student writes to discuss a concept or issue with others in the group, he/she will have to go through a process of synthesizing, organizing, and then expressing in semantic manner. This process usually helps the learner to be clearer about the material and retain longer in the memory. Since learning takes place by assimilating new information into their existing cognitive structures or accommodating their cognitive structures to new information, teaching methods should therefore provide activities that challenge and engage students in order to cause assimilation and accommodation to take place. Students' discussions on bulletin board, group collaborative projects required them to have the necessary knowledge to participate in these activities. E-mails between the students and the instructor also reinforce active engagement with the material and collaborative learning in writing. Therefore, knowledge is not something that is "delivered" to students, but rather something that emerges from active dialogue among those who seek to understand and apply concepts and techniques (Hiltz, 1994).

It has to be realized that students and faculty who operate in the web-based environment encounter various barriers to their success that do not exist in the traditional face-to-face classroom (Hillesheim, 1998). There were also concerns from the instructor's observations. For instance, working in a group restrains the nature of freedom of online learning, because group members have to commit to some face-to-face meetings; there were occasional free rides in groups, some students may complain that a member did not contribute as much to the project; in addition, delay of communication can be frustrating sometimes because e-mails and postings did not get an instant reply; finally, compared to classroom settings, it is obvious that the lack of physical proximity and emotional communications exist in any web-based environment.
REFERENCE


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Field-Dependent Students in Physical Education: Their Limitations and the Solution Thereof

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Abstract

A review of 21 studies concerning the relationship between field dependence-independence and physical education as well as sport was conducted. It was disclosed that field-dependent students (roughly one quarter of the total public school students) have considerable disadvantages in physical education and sport settings. Compared with field-independent students, field-dependent students are less physically active and less athletically skilled, and slower or less effective in motor skill learning. They were also found to have inherent learning behavior problems with the physical education class, and gain less success academically and behaviorally. As a result, field-dependent children were found to be less physically. The possible reasons for the limitations on the part of field-dependent students were discussed in detail, and corresponding adaptations in instructional strategies are provided to help field-dependent students learn more effectively and enjoy more in the physical education class. These strategies include breaking down the presentation and explanation of the novel motor task into many pieces and intersperse them throughout the entire class, using more pictorial and visual materials to make abstract tasks more specific and concrete, making repetitive and monotonous practices "meaningful", and using step-by-step approaches such as segmentation, simplification, fractionization, and attentional cueing technique. To understand and help field-dependent students further, future research directions are also provided.

Field dependence-independence is a cognitive style that initially came from Witkin and his colleagues’ research (Saracho, 1997). Field dependence-independence cognitive styles, according to Witkin et al. (1977), are contrasting ways of processing information. People who have tendency to rely on self as a primary referent for their information processing are classified as field-independent people. On the other pole of the continuum are field-dependent people who have a tendency to rely on the field (i.e., others and environment) as a primary referent for their information processing. Because field dependence-independence is closely related to daily life, especially to education and vocation, and effective procedures are available for its assessment (Witkin & Goodenough, 1981), thousands of studies were generated over the past five decades since it came into being. This paper, on the basis of a literature review, will concentrate on the discussion of what has been found regarding field dependence-independence in the physical education setting,
of the implications that the findings may have in physical education teaching, and of research tendency of the issue in the future.

The Evolution of the Concept of Field Dependence-Independence

In the 1940s, when Witkin and his colleagues were seeking to determine how people locate the upright as quickly and accurately as they ordinarily do, subjects were found, unexpectedly, to be markedly different from one another in their performance on the space orientation tasks (Witkin & Goodenough, 1981) among which was the Rod-and-Frame Test (RFT). In the RFT (Asch & Witkin, 1948), the subject sat in a completely darkened room facing a luminous tilted rod surrounded by a luminous tilted square frame. The subject was asked to adjust the tilted rod until he or she considered the rod to be physically vertical. Some subjects were so influenced by the tilted frame that they could not adjust the rod to a position close to verticality. Other subjects, in contrast, apparently relied mainly on their body as a reference and could adjust the rod to a relatively vertical position ignoring the influence of the tilted frame. As a result, people relying mainly on self to adjust the tilted rod in the RFT were classified as "field-independent" people. People influenced very much by the tilted frame in the RFT were classified "field-dependent" people (Witkin & Goodenough, 1981).

Another common-used test for assessing field dependence-independence is the Embedded-Figures Test (EFT). In the EFT the subject was asked to identify simple figures within more complex patterns. It was hypothesized that the person who could separate the rod from the frame in the RFT (field-independent people) could identify a simple figure within a more complex pattern more easily, and the hypothesis was supported (Witkin & Goodenough, 1981). Afterwards RFT and EFT are two interchangeable tests for assessing field dependence-independence.

Subsequent studies discovered that the characteristics of field dependence-independence showed themselves consistently and pervasively in many domains, such as perceptual, intellectual, emotional, motivational, defensive, and social operations (Saracho, 1997; Witkin et al., 1977; Witkin & Goodenough, 1977, 1981). Generally, field-independent people have a tendency to rely on self as a primary referent for their behavior. They have greater individual autonomy of external reference. They are impersonally oriented and relatively lacking in social skills and interpersonal competencies. They are generally cold and distant in relations with others, and more able than field-dependent people to separate themselves from others and environment. When compared with field-dependent people they have greater accuracy in personal perception, have a more articulated body concept, and have stronger cognitive restructuring ability (Witkin & Goodenough, 1981). By contrast, field-dependent people have a tendency to rely on the field (i.e., others and environment) as a primary referent for their behavior. They function less autonomously and seem likely to adhere to the field more than field-independent individuals. They are interpersonally oriented, pay more attention to and use more social cues. They generally favor situations that bring them into contact with others over solitary situations. They show more social behaviors and attributes important for effective interpersonal relations, and are better able to get along with others than field-independent people (Saracho, 1997; Witkin & Goodenough, 1981).
Field Dependence-Independence and Motor Skills/Ability

Since field-independent people have a more articulated body concept and can rely more on proprioceptive information in assessing their own body position on the Rod-and-Frame test, it is hypothesized that people with higher skills in athletic activities or higher motor ability, who must rely on accurate proprioceptive information to make rapid postural adjustments while moving through space, are more field independent than their low-level counterparts (Meek & Skubic, 1971). Along this line several studies were conducted to compare field dependence-independence between national level or university varsity athletes and non-athletes.

As early as 1978, Rotella and Bunker made a comparison in dependence-independence between twenty senior male tennis players and a similar aged non-athlete group. As expected, the senior tennis players were found to be significantly more field independent than the non-athlete group. In McLeod's (1985) study, the Rod-and-Frame test was administered to 120 subjects who were either participating in varsity sports in swimming, gymnastics, basketball, volleyball and soccer, or non-participants. The comparison indicated that varsity athletes were more field-independent than non-participating subjects. More recently, a study by Brady (1995) involved university athletes who were currently participating in Division II of the NCAA and a similarly sized group of non-athletes. Again the resembling results were obtained that highly athletic skilled and physically active individuals are more field independent than the less athletic skilled and less fit ones. The congruent findings also came from Liu (1991), when RFT scores of elite male high jumpers were compared with those of non-athletes. It seems the only exception in this issue is the study by Cano and Marquez (1995). The result they found was just opposite to that mentioned above.

The similar comparisons were also made with the public school students as subjects, who were obviously much more homogeneous in their sport skills and sport abilities than national level or varsity athletes and non-athletes. Despite this homogeneity, however, the findings were consistent with those noted above. Meek and Skubic (1971) found that highly skilled high school females were significantly more field independent than the poorly skilled subjects. In another study with junior high school females, Shugart, Souder and Bunker (1972) selected 30 girls who obtained RFT scores at the two extreme ends of the continuum of field dependence-independence (15 field-independent and 15 field-dependent subjects). A test for dynamic, non-locomotor balancing ability was then administered to them. The data analysis revealed that the field-independent group performed significantly better on the stabilometer test of balancing ability. Still with high school students as subjects, Docherty and Boyd (1982) examined the relationship between field dependence-independence and several sport skills via a multiple regression analysis. Results again supported the above-mentioned hypothesis by showing that the ability of an individual to differentiate visually a simple object from a complex background does account for a small but significant proportion of the variance in motor performance of volleyball, tennis, and badminton.

In 1990, Raviv and Nabel conducted a study that involved the administration of two instruments, Rod-and-Frame apparatus and Group Hidden Figures Test, for assessing field dependence-independence. Ninety-four subjects, boys and girls, again were all high school students. Of these subjects 33 were active in individual sports, 31 were in team sports, and 30 were non-athletes. On both measures, high school student athletes, both in individual sports and in team sports, were characterized by field-independence, while non-athletes
were relatively field-dependent. Consistent with these findings is McLeod's (1987) study in which public school students were involved. Again student athletes were found more field-independent than their non-athlete counterpart.

It seems that research on the relationship of field dependence-independence to athletic skills/abilities produced highly consistent results: people with high athletic skills and abilities are more field independent that those with poor athletic skills and abilities.

**Field Dependence-Independence and Sport Skill Learning**

If people with high athletic skills and abilities are more field independent than those with poor athletic skills and abilities, then does it follow that field-independent people could learn sport skills faster and better than field-dependent people? This question seems to have implications for physical education teaching.

EFT is challenging in cognitive restructuring or analytical ability (Witkin & Goodenough, 1981). Since field-independent people can obtain higher scores on various embedded figures tests than do field-dependent people, the former are considered to have higher analytical ability and will be more successful in learning situation in which the inherent structure is lacking. Conversely, because field-dependent individuals are poorer in analytical and restructuring ability, they could be less successful in an unstructured learning situation that requires them to analyze the structure and find the inherent relationship of the task for themselves. In the physical education area, when students are initially presented with a new sport skill, they are usually unaware of the idea about the relationship of the parts to the whole skill, experiencing the new skill as an item lacking a clear inherent structure.

In addition, learners in physical education class who learn new motor skills rarely have textbooks available. Instead, learners depend mainly on the teacher for information of new sport skills when the teacher gives presentation and demonstration. This source of information is, of course, not always available when needed: this makes the analytical ability more critical.

Swinnen is one of the most active investigators in this aspect. One of his studies (1984) involved learning new motor skills on the trampoline. The study was designed so that only some global demonstrations and verbal presentation of the skills were presented, no detailed information of movement parts were given, leaving organization and structuring of the task-to-be-learned to the subjects. Young subjects who were not familiar with the trampoline were chosen as the subjects. The learning aim was to perform the skill as well as possible without external aid after initial global demonstrations and presentation. The hypothesis of Swinnen's study was that field-dependent subjects would show a lower learning rate than field-independent subjects in an unstructured learning situation. This hypothesis was supported in the study for boys, although not for girls. Two years later, Swinnen and colleagues (Swinnen, Vandenberghe, & Van Assche, 1986) conducted another similar study with more than one hundred subjects of 13-year-old boys and girls. Again, the result was in favor of field-independent subjects.

For their thesis and dissertation, Jorgensen (1972) and MacGillivary (1980) also examined the relationship between field dependence-independence and motor skill learning. In Jorgensen's study, university subjects were required to learn a novel movement task - the Alaskan Yo-Yo. The results indicated that the rate of learning for groups was significantly
different and in favor of field-independent subjects. In MacGillivray's study, the learning of a ball catching task was used, and field-independent subjects demonstrated a significantly greater rate and amount of learning than the field-dependent subjects. Consistent with the above results is another study by Goulet, Talbot, Drouin, and Trudel (1988) in which it was found again that field-independent subjects tended to learn more in motor learning. Since field independence is concerned with analytic functioning and characterizes a person's problem-solving abilities, and since rapid learning has been associated with similar conceptual elements of differentiation and structuring, it would seem reasonable that rate of motor learning and field independence are related (Jorgensen, 1972).

Swinnen (1983) produced another way to understand the relationship of the rate of motor learning to field dependence-independence. Swinnen argued that, in motor learning, the movement image and the way it is built up are so important that they could be seen as one possible explanation for the better motor performance on the part of field-independent individuals. Based on this argument, the study of Swinnen conducted in 1983 involved no actual practice for learning motor tasks. Instead, the subjects were asked to describe the gymnastic skills observed from the video. The results indicated that field-independent persons tended to give more complete descriptions of observed movements and the difference was statistically significant. Because the field-independent individuals bear the superior analyzing and structuring ability, they can build a more structured visual image of movement in the learning environment lacking a clear inherent structure, and this probably leads them to a better position to learn new motor skills (Swinnen, 1983).

As with the research on the relationship of field dependence-independence to athletic skills/abilities, the research on the relationship of field dependence-independence to sport skill learning yielded highly congruent results. Field-independent individuals could learn novel motor skills faster and better than can field-dependent individuals. This has raised physical educators' concern for field-dependent students in the physical education class.

Learning Behaviors of Field-Dependent Students

Since it has gradually become unambiguous regarding the relationship of field dependence-independence to athletic skills/ability and sport skill learning, the studies in these aspects became sparse recently. Now the concern of the physical educators begins to shift to investigating the learning behaviors of students with different field dependence-independence in the physical education settings in order to understand better their contrasting differences associated with motor learning/ability. This concern will, ultimately and hopefully, lead to the adaptation of teaching strategies that can meet the individual differences and needs of students in physical education class, especially for field-dependent students.

Field-dependent students, as already popularly considered and discussed previously, have less analytical and restructuring ability, view the task as a whole without attempting to discern distinctions. Further, they were also to be found to have less memory storage capacity and mental energy (Frank, 1983), compared with field-individual students. These limitations, as considered wildly, could make field-dependent students less likely to be successful in a highly analytical learning environment, and in a complicated novel motor task learning environment.
Ennis and her colleagues (Ennis, Chen, & Fernandez-Balboa, 1991; Ennis & Chepyator-Thomson, 1990; Ennis & Lazarus, 1990) carried out a series of studies identifying field-dependent children's specific learning behaviors in physical education classes. In their first two studies (Ennis, Chen, & Fernandez-Balboa, 1991; Ennis & Chepyator-Thomson, 1990), it was found, compared with field-independent children, field-dependent children indeed had some learning behavior problems within the analytical concept-based curriculum. As a result, they were unable to respond correctly when questions regarding prior directions or the serial order of tasks were asked, and could not work through the tasks in a prescribed sequence without watching other classmates working first.

The second salient learning problems observed with field-dependent children was their inability to understand why they had to perform certain tasks. It was especially true when the tasks were related to abstract movement concepts or were repetitive and monotonous, such as hitting the balls with the paddles against walls, and ball-dribbling task. When those tasks were assigned, field-dependent children thought that these tasks were not meaningful and the purpose of practicing them was obscure. This perspective tended to result in "off-task behaviors that were disruptive to the educational environment" (p. 179) unless the teacher remained close enough providing them with positive and supportive feedback. Field-dependent children's third observed learning problem was that they were uncomfortable with having to work alone. They tried from time to time to diverge from their tasks to join other children when required to work alone and this decreased their on-task time and learning rate.

As a consequence, field-dependent children experienced much less success and much more nonsuccess in the physical education class (movement analytical curricula) than field-independent children, especially in academic area (Ennis, Chen, & Fernandez-Balboa, 1991). It was also found that the PE teacher selected field-dependent children to respond and demonstrate less often than field-independent children (Ennis, Chen, & Fernandez-Balboa, 1991).

Ennis and Lazarus (1990) did the third study in the series to observe and analyze field-dependent children's learning behaviors in the physical education settings. Due to the limitation of memory storage capacity and mental energy on the part of the field-dependent children, it was hypothesized that field-dependent children would choose less effective strategies, which require less memory storage capacity and mental energy, to accomplish a product-oriented motor performance in a complex environment (Ennis & Lazarus, 1990). In their study this complex novel motor task learning environment was intentionally designed. The motor task for the children to accomplish was to intercept a ball that had been rolled down a 3 feet ramp. The children began moving from a marker in front and to the side of the base of the ramp as soon as the ball was released at the top of the ramp, and were encouraged to intercept the ball as quickly as possible.

The results revealed that, compared with field-independent children, field-dependent children consistently chose an angle of approach toward the ball that allowed them to have more time to monitor the speed and the direction of the moving ball and their own moving speed to the ball, reflecting their limitation to processing multiple information within a short time period. When the action of interception of the ball was analyzed, it was found that field-dependent children reduced a complex open task to a closed task in which they could separate the task and thus complete it more easily. Instead of intercepting the ball while running, the field-dependent children broke down the task into three parts: "(a) running to appropriate location to wait for the ball's arrival, (b) turning to face the ramp, and (c) intercepting the ball" (p. 43). This suggested that field-dependent children found it
difficult to integrate running with intercepting, which requires bigger working memory capacity and more mental energy for information processing and decision making.

In summary, the studies by Ennis and her colleagues confirmed less effective learning behaviors in the physical education settings on the part of the field-dependent children. These less effective learning behaviors were typically evident when analytical concept-based curriculum was involved that requires highly analytical and restructuring ability, and when a complex motor task learning environment was provided that requires high information procession ability. The findings of field-dependent children's less effective learning behaviors is in accordance with and parallels the results discussed in the previous sections that field-dependent individuals are less athletic skilled and slower in novel motor task learning. These results suggest important implications for the physical education teaching and research directions of the issue in the future.

Implications and Research Directions

On the basis of the discussion in the above sections, it is almost conclusive that, compared with field-independent individuals and children, field-dependent individuals and children have considerable disadvantages in sports and the physical education settings. They are usually less athletically skilled and less physically active, and slower learners in novel motor task learning, especially when the learning situation is unstructured. They have also lower ability to establish the clear image of novel movement. Further, when a complex novel motor task learning environment is provided to field-dependent children that requires high rate information processing, they tend to use a less effective strategy to simplify the complex motor task. In physical education classes of movement analysis models, field-dependent children find it difficult to attend to and remember directions, fail to understand the meaning of practicing repetitive and monotonous motor tasks, and are uncomfortable to work alone. As a consequence, field-dependent children experience much more academic nonsuccess in analytical concept-based physical education curricula.

Implications in Physical Education

Physical educators can make relevant adaptations in instructional strategies to help field-dependent children learn better and enjoy more in physical education classes. Since field-dependent children are usually less athletically skilled and slower in learning a novel motor task, especially in an unstructured learning situation, it is necessary for the PE teacher to establish a structured learning situation for field-dependent students to learn novel motor tasks. This requires first an exhaustive analysis and a thorough understanding of the motor skill on the part of PE teachers. Next the different lead-up practices, modified and simplified versions of target novel motor task can be introduced to provide a step-by-step approach to the easy and ultimate mastery of the novel motor task for field-dependent children. These part-task learning strategies (Wightman & Lintern, 1985) include segmentation (partitioning the skill according to certain spatial and/or temporal criteria) and simplification (various aspects of the skill and or environment are simplified). For example, an open skill can be introduced first as several related closed skills), and fractionization (two or more components of the skill that are normally performed simultaneously are practiced in isolation). Then the attentional cueing technique (Rose, 1997) could be utilized in which field-dependent children are allowed to practice the skill in its entirety while their attention is directed to one or two important aspects of the skill.
This step-by-step approach simplifies the novel motor task and emphasizes only one or two elements each time, thus making the task much easier to learn.

A structured learning situation designed for field-dependent children also should include the concise, explicit, but repetitive presentation or explanation of novel motor tasks. Instead of traditionally giving a long initial presentation at the very beginning of the PE class and letting students to practice for the rest of the class with little necessary repetitions of the presentation or explanation (this strategy is very hard for field-dependent children, who are considered to have limited memory storage capacity and mental energy), the PE teacher should break down the presentation and explanation of the novel motor task into many pieces and intersperse them throughout the entire class period with emphasis on only one or two elements. In fact, Ennis (1991) already conducted a study of how to facilitate the learning of field-dependent children in the PE class. In her study, the Explicit Organization strategy was used in which the PE teacher "limited presentations during the introductory phase of the class to one major concept" (p. 102), and reiterates the key element "throughout the introduction, demonstration, and practice sections of the movement lesson" (p. 99). The repetitive use of terms and phrases not only emphasizes major concepts but reminds children of what and how they should perform the task (Ennis, 1991).

Further, the PE teacher should make abstract tasks more specific and concrete to enhance the learning rate of field-dependent children who lack analytic ability. In Explicit Organization strategy used in Ennis’ (1991) study, the PE teacher used a lot of pictorial and demonstration material, and "developed posters and cards...to remind children of the appropriate performance and reinforced the major concepts consistently throughout the lessons" (p. 102). This concrete manner reduced the demand of mental energy and helped field-dependent children establish a clearer image of the novel movement and thus enhancing their learning rate.

If repetitive and monotonous practices are an unavoidable part of the curriculum, the PE teacher should try to adapt these sterile practices by adding some "meaning" to them. For example, when hitting balls with the paddles against walls, some target area could be drawn on the wall and field-dependent children are required to hit the ball into the target area as many times as possible. Field-dependent children could be encouraged to stick to the practice by competition with peers or other reinforcements, such as a possible demonstration (for the winners) to the entire class or token economy. The ball-dribbling task could also be made more "meaningful" for field-dependent children by the similar strategies. These two repetitive and monotonous tasks are ones that field-dependent children thought meaningless in Ennis and Chepyator-Thomson's (1990) study.

Another characteristic of field-dependent children is their preference to play and learn in social settings (Saracho, 1989) and uncomfortable to work alone. Thus, a certain form of cooperative learning can be introduced to enhance their interests and engagement of the task. Ennis (1991) used student pairing in which field-dependent children were paired with field-independent children. "The excitement created by the socially reinforcing environment seemed to increase the interest and attention of the field-dependent children with the content" (p. 106). However, although field-dependent children in the student pairing were fostered to be a successful partner and learned the content in the task, they relied on the field-independent children's going through the cognitive process and decision making (Ennis, 1991). It seems other forms of cooperative learning that can encourage field-dependent children's cognitive involvement are needed to be explored.
Finally, it should be clear that it is not necessary to accommodate all the instructional strategies to meet field-dependent children's needs. Rather, field-independent instructional strategies should be kept to some degree to challenge field-dependent children. Children of different ages are at their unique developmental stage psychologically and cognitively. According to the literature (Witkin et al., 1954; Witkin, Dyk, Faterson, Goodenough, & Darp, 1962; Witkin, Goodenough, & Karp, 1967), children's development of cognitive style is clearly from a field-dependent to a field-independent mode of functioning until about 17 years. Field-independent instructional strategies might help children's development of cognitive style toward the direction of field independence, which has shown its advantage over field dependence in academic settings (Paramo & Tinajero, 1990). In addition, because of people with either field-dependent or field-independent cognitive style have qualities that are adaptive in particular circumstances (Witkin & Goodenough, 1981). Saracho and Spodek (1981, 1986) have recommended that children be educated to have cognitive flexibility, which means bearing both field-dependent and field-independent cognitive styles to some degree. Consequently, it seems that different instructional strategies can be accommodated either to meet field-dependent children's needs or to foster their cognitive development, depending on the PE teacher's purpose.

Research Directions

Ennis and her colleague's investigations about field-dependent children's learning problems were mainly associated with the movement analysis curricula, and few studies were conducted with other curriculum models, especially the sport education model in which open skill-dominated sport constitutes a considerable portion.

The condition of a sport with preponderance of open skills can be full of relevant and irrelevant stimuli that require children's selective attention and decision making within a short time. The relevant stimuli that need to be distinguished from irrelevant stimuli are also termed the regulatory conditions (Gentile, 1972). When a child is attempting to catch a flying ball in baseball/softball, for example, the regulatory conditions include the speed, direction, trajectory of the moving ball, and how the child organizes his or her movement pattern to reach the desired position in space at the appropriate time to interact successfully with the ball. Although it could be inferred that field-dependent children would experience difficulties in the open-skill situation due to their motor-related weaknesses (less athletic ability/skills, slow in motor learning) and limited memory storage capacity and mental energy, relevant research is desirable to confirm the hypothesis and find out exactly what specific learning problems a field-dependent child encounters and how the PE teacher will deal with these problems.

Field-dependent children's learning behavior problems in the PE class might be accompanied by another concern - their physical fitness development. Field-dependent children's less athletic abilities/skills and slow rate in motor learning might result in their less engagement in and out of the PE class, which in turn, results in their inadequate development of physical fitness. Guyot, Fairchild, and Hill (1980) examined the relationship of field dependence-independence to elementary school children's physical fitness. It was found that girls with low levels in physical fitness were significantly more field dependent than the other groups. This suggests that field-dependent children's physical fitness could be another concern. More research is needed to confirm Guyot et al. finding, and education of life-time participation of physical activities to field-dependent children and adolescents constitutes another meaningful and challenging research area.
Ennis and her colleague's studies discussed above emphasized the cognitive aspect of field-dependent children's learning problems. The problems in motor aspect for field-dependent children, however, should not be ignored. Field-dependent children come to the PE class not only with less analytical ability (cognitive limitations), but also with less developed body awareness or less availability of proprioceptive information as well, which is reflected in Rod-and-Frame test (RFT). Therefore, field-dependent children's observed learning behavior problems in the PE class could not be entirely attributed to their cognitive limitations. Their limitations in motor aspect (less availability of proprioceptive information) also account for a considerable portion of their learning problems in the physical education settings.

It seems that gaps have emerged as to how and to what extent field-dependent children's observed learning behavior problems can be attributed to their inferiority in motor ability rather than their cognitive limitations, and how to deal with these motor ability-related learning problems. The subsequent problems could also arise, such as how motor-related shortcomings and cognitive-related weaknesses interact on field-dependent children's learning behaviors in the PE class. The problems of study in the future seem interesting and challenging.

REFERENCES


Field-Dependent Students in Physical Education: Their Limitations and the Solution Thereof


Development of Tennis Sport Clinic Program for the Effective Tennis Teaching

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Abstract
The purpose of this study was to develop an assessment tool to evaluate performance of the ground stroke in tennis. Reliability for the assessment tool was also investigated. Problems that are frequently displayed by the novice performer were verified and guidelines and unique suggestions for the proper acquisition of teaching methods were presented. Analysis of the ground stroke was conducted in order to develop the assessment scale. Subjects included 19 students who were taking beginning tennis classes at Myong-ji University.

Results of this study indicated the following:
1) The ground stroke can be divided to 4 steps - footwork or readiness, backswing, forward swing or half impact, and follow-through or finish.
2) The reliability of the assessment tool demonstrated satisfactory levels for both the forehand stroke and backhand stroke. The reliability coefficient of the forehand stroke was 0.85, while that of backhand stroke was 0.79.
3) Accuracy of the backswing relates significantly to the entire motion of the ground stroke. Therefore, when a coach teaches the ground stroke to the beginner, the accuracy of backswing should be emphasized.

INTRODUCTION

Today, the trend in sport participation is towards lifelong sports such as tennis that can be played by everyone. This is seen by some as a solution to the problem arising from the lack of exercise for many people. Also, it is thought to promote the development of personal relationships. Therefore, many people are playing tennis and desire to learn it (Hukui, 1984).

There are few people, however, who realize exactly that part is most important to enhance one’s ability to play tennis. As a result, many people think that they can play well if they perform just one action consistently (Japan Tennis Association, 1986).

A new aspect of sport study being used in sport clinic programs is to apply experience in teaching to the scientific teaching of the sport (Maekawa, 1981). Based upon a biomechanical analysis of tennis motion, we first identify the fundamental skills of tennis. We then divide the fundamental skill patterns of tennis into a set of standard motions and provide appropriate instruction. After providing instruction of the fundamental skill patterns in tennis, we then seek to test the skill performance.
METHOD

Subject

The subjects in the present study were 19 students who participated in physical education tennis classes at Myong-ji University. The duration of instruction was one semester (15 weeks) during which they were taught the fundamental skills of tennis.

Data Collection

Data were collected through photographic techniques as students executed forehand and backhand strokes. Before taking photos, all students were given proper warmup activities and stroke practice. After practice, students assumed a location behind the center position and performed each stroke 10 times while being photographed.

Development of tennis fundamental skill check list

A check list is particularly useful by the instructor who does not have specialized knowledge and skill about tennis. In an attempt to develop a useful checklist, we first considered the general nature of the tennis ground stroke and attempted to describe in clear, specific terms, the characteristics of the fundamental skills of the ground stroke. Then we applied the following criteria to the development of our checklist (Park, 1996; Kim, 1978; Gonzales, 1970; Gensmer, 1969):

1) Use language which can be understood easily.
2) Make the list brief to facilitate its usage.
3) Divide the ground stroke pattern into clear, concise skills.

Content validity and reliability of fundamental tennis skill check list

After developing the check list, we sought the advice of five tennis experts and five general students in order to check the content validity of the tennis fundamental skill check list. In addition, reliability of the check list was determined using the test-retest method for the forehand and backhand ground strokes (Wiresma & Jurs, 1990).

Statistical analysis

1) Based upon the literature review, we broke the forehand and backhand ground strokes into specific fundamental patterns that served as the basis to investigate the content validity of the check list (Chung, 1998).
2) Correlation coefficients were calculated to estimate the reliability of the fundamental tennis skill check list.
3) The average score on the fundamental tennis skill check list was used as feedback to the students in order to assist the tennis instruction.
RESULTS AND DISCUSSION

Components of check list

1) forehand ground stroke

(1) ready position and footwork
As we chase the ball, we should turn our shoulder in preparation for the back swing. When we are near the ball, the position of the left foot should be determined in order to insure proper timing and footwork. Avoid the extreme cross and open stance, move weight to the left foot with a light cross stance.

(2) back swing
The back swing moves the racket backwards into a ready position to hit the ball. This should be done as fast as possible. This is, the moment the ball leaves the opponent’s racket, you should estimate the length and direction of the ball and prepare for the start of the back swing.

(3) forward swing
The forward swing involves moving your body forward to hit the ball with your racket. In order to make an exact hit, you have to move in the direction from which the ball flies. When you execute the forward swing, you try to make the ball hit your racket center in order to gain power from your powerful swing. When performing the forward swing, you should swing the racket parallel with ground as much as possible.

(4) impact
Impact is the moment at which the racket hits the ball and the point at which power is transferred to the ball. Generally, the proper impact position is in front of the forward foot. At this position, you can hit the ball with sufficient power.

(5) follow through
Follow through is continuing the forward swing after contact. After hitting the ball, the racket does not stop its forward movement as you swing through the ball towards the opposite side.
Table 1: Assessment Tool of Tennis Forehand Ground Stroke

<table>
<thead>
<tr>
<th>Domain</th>
<th>Check point</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready and footwork</td>
<td>* Ready position for quick movement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Fast movement towards direction of ball with foot work</td>
<td></td>
</tr>
<tr>
<td>Back swing</td>
<td>* Compliment of swing arc, being focused on ball direction</td>
<td></td>
</tr>
<tr>
<td>Forward swing &amp; impact</td>
<td>* Weight is transferred back foot to the forward foot</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Powerful impact at the position of forward foot</td>
<td></td>
</tr>
<tr>
<td>Follow through &amp; finish</td>
<td>* Swing which pushes the ball towards the target</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Return quickly to ready position</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Forehand Ground Stroke (Beginner Level: Internet Tennis Japan, 1999)
2) Backhand ground stroke

(1) Ready position and foot walk
From the ready position, pivot on the right (pivot) foot and place the left (rear) foot behind
the body in a position parallel to the net. Move your body towards the side line and shift
your weight to the back foot with a light cross stance.

(2) Back swing
With one hand touching the neck of the racket, pull the racket back as you turn your waist
fully.

(3) Forward swing
Starts with a turning of the waist and shoulders towards the net, with the arm and racket
trailing.

(4) Impact
Move your weight to the forward foot and hit the ball at the point of the front foot using
with a flat-faced racket in a position parallel to the ground. The arm is fully extended at
impact point, with the wrist and grip held firm.

(5) Follow through
The arm movement continues straight forward towards the net. Swing the racket in the
direction you intend the ball to go. The last formation is just like a bird which stretches its
wing.

Table 2: Assessment Tool of Tennis Backhand Ground Stroke

<table>
<thead>
<tr>
<th>Domain</th>
<th>Check Point</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready and footwork</td>
<td>* Ready position for quickly movement</td>
<td>1, 2</td>
</tr>
<tr>
<td></td>
<td>* Fast movement towards direction of ball with foot work</td>
<td>3</td>
</tr>
<tr>
<td>Back swing</td>
<td>* Compliment of swing arc, being focused on ball direction</td>
<td>4</td>
</tr>
<tr>
<td>Forward swing &amp; impact</td>
<td>* Shift weight and start forward as ball bounces</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>* Powerful impact at the position of forward foot</td>
<td></td>
</tr>
<tr>
<td>Follow through &amp; finish</td>
<td>* Swing which pushes the ball towards the target</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Return quickly to ready position</td>
<td></td>
</tr>
</tbody>
</table>
Figure 2: Backhand Ground Stroke

Beginner Level
(Footwork) (Back swing)

Masters Level
(Footwork) (Back swing)

(Foreward swing) (Impact)

(Follow through)

(Follow through)
Content validity results

After developing the fundamental tennis skill check list, to verify content validity, we let five tennis experts and five general students check the content validity of the tennis fundamental skill check list. There was general opinion that if we used simpler sentences or words to understand the explanation of stroke pattern, the degree of understanding may be higher. But, for the most part, they were satisfied with the tennis fundamental skill check list.

Reliability results

The reliability of the fundamental tennis skill check list was conducted by using 19 students who participated in tennis classes at Myong-ji University. The test-retest method was used to calculate reliability.

1) Reliability of forehand and backhand stroke assessment tool

As shown as Table 3, after two test administrations, the results indicated high correlation coefficients, about (r=0.8). Therefore, this assessment tool looks to have high stability reliability, thus providing evidence that it would be a proper method for assessing tennis ground strokes.

Table 3: Reliability of Tennis Ground Stroke Assessment Tool

<table>
<thead>
<tr>
<th>Ground stroke</th>
<th>Measurement</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forehand stroke</td>
<td>1-2times</td>
<td>0.85</td>
</tr>
<tr>
<td>Backhand stroke</td>
<td>1-2times</td>
<td>0.79</td>
</tr>
</tbody>
</table>

Characteristic of subjects among the domains by assessment tool

To examine the characteristics of the subjects' fundamental tennis skills using the assessment tool in this study, we used the average scores in each domain area for the 19 subjects. As shown as Table 4, in the case of the forehand ground stroke, the mean scores of the back-swing, forward-swing, and impact were lowest. Therefore, the proper instruction method needs to focus to these domains. Hence, a compact back swing with a covered racket and repeated forward swing practice would be a most effective instruct strategy.

In the case of the backhand ground stroke, the domain of the forward swing and impact produced the lowest mean scores. A poor back swing, however, was the second lowest score. In the case of the backhand ground stroke, a player uses the opposite muscles which are not used in routine life, thus necessitating the accumulation of energy by using a proper back swing. So in this case, a perfect back swing which uses circulation of the waist, with repeated practice of the forward swing would be the most effective instruction strategy.
Table 4: The Score of Each Domain by Assessment Tool

<table>
<thead>
<tr>
<th>Domain</th>
<th>Subject</th>
<th>Forehand stroke</th>
<th>Backhand stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>ready &amp; footwork</td>
<td>19</td>
<td>3.86 ± 0.86</td>
<td>3.71 ± 0.82</td>
</tr>
<tr>
<td>back swing</td>
<td>19</td>
<td>3.71 ± 0.99</td>
<td>3.29 ± 1.13</td>
</tr>
<tr>
<td>forward swing &amp; impact</td>
<td>19</td>
<td>3.71 ± 0.83</td>
<td>3.00 ± 1.01</td>
</tr>
<tr>
<td>follow through &amp; finish</td>
<td>19</td>
<td>4.00 ± 0.78</td>
<td>3.43 ± 0.85</td>
</tr>
</tbody>
</table>

CONCLUSION

This study was designed to develop and verify an assessment tool of tennis ground strokes that may be useful in tennis sport clinics to identify problem areas for beginning tennis players and thus facilitate instruction. To achieve these goals, a literature review provided the basis for dividing tennis ground strokes into fundamental patterns and thus serving as the framework for the assessment tool. Nineteen students enrolled in tennis classes at Myong-jji University were used to test the assessment tool. The following results were obtained:

1) Fundamental patterns of tennis ground strokes
According to literature review, four domains - back swing, forward swing, impact, follow through and finish were identified.

2) Reliability of assessment tool
The results of the reliability testing of the assessment tool indicated that the forehand stroke (r=0.85) and backhand stroke (r=0.79) had sufficiently high reliability to recommend the use of the assessment tool for instructional use in a tennis sport clinic.

3) Diagnosis use of assessment tool
When we examined the score characteristics of each domain area, the quality of the back swing influenced ground stroke performance. So in the case of a beginner, the development of a tennis ground stroke instructional strategy that is focused on teaching a proper backswing is thought to be necessary.

REFERENCE