EFFECT OF ACTIVITY SPACE ON PRIMARY STUDENTS’ PHYSICAL ACTIVITY DURING PHYSICAL EDUCATION LESSON

BY

NG WAI ON
01013084

AN HONOURS PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF ARTS

IN

PHYSICAL EDUCATION AND RECREATION MANAGEMENT (HONOURS)

HONG KONG BAPTIST UNIVERSITY

MARCH 2004

HONG KONG BAPTIST UNIVERSITY

MARCH, 2004
We hereby recommend that the Honours Project by Mr. Ng Wai On entitled “Effect of activity space on primary students’ physical activity during physical education lessons” be accepted in partial fulfillment of the requirements for the Bachelor of Arts Honours Degree in Physical Education and Recreation Management.

Dr. Chow Bik Chu
Chief Adviser

Dr. Louie Hung Tak
Second Reader
ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my university teachers, my chief adviser, Dr. Chow Bik Chu and second reader Dr. Louie Hung Tak for their valuable advices on the project and sharing part of their research data for my project. Meanwhile, I am also grateful to Ms. Regine Ma of Hong Kong Baptist University, who assisted in contacting schools and arranging for observations. Moreover, I would like to thanks all the PE teachers from the observed classes

Ng Wai On
Department of Physical Education
Hong Kong Baptist University

Date: 15th March, 2004
ABSTRACT

The objective of this paper is to investigate the effect of the activity space on physical activity levels of primary students (primary 4-6) during physical education lesson. A total of 90 primary school students sampling from 516 students are involved in the study. Apart from one's age, taking on physical activity is a complex process, reflective of multiple personal, interpersonal, and environmental variables (Nahas, Goldfine & Collins, 2003). A variety of theories are discussed including hierarchical model, integrated model, flow theory, and theory of planned behavior for the interpretations of the results. In addition to the theoretical underpinnings, various determinants of activity are discussed. Independent-samples T-test and Pearson product-moment Test were used to analyze the data. The results indicated that there was no correlation between activity space and students' activity levels during physical education lessons. But some teachers' behavior and lesson contexts can affect students' activity levels.
<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>2</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>2</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>4</td>
</tr>
<tr>
<td>Delimitations</td>
<td>5</td>
</tr>
<tr>
<td>Limitations</td>
<td>6</td>
</tr>
<tr>
<td>Significant of the Study</td>
<td>7</td>
</tr>
<tr>
<td>2. REVIEW OF LITERATURE</td>
<td>9</td>
</tr>
<tr>
<td>Importance of Being Active in Physical Education Class</td>
<td>10</td>
</tr>
<tr>
<td>Constraints and Motivations</td>
<td>12</td>
</tr>
<tr>
<td>Factors Affecting Students’ Participation in Physical Education Classes</td>
<td>14</td>
</tr>
<tr>
<td>Hong Kong Situation</td>
<td>20</td>
</tr>
<tr>
<td>Measuring Physical Activity</td>
<td>23</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

Physical education could facilitate children development in lifelong active participation practice in physical activity (Bugler, Townsend & Linda, 2001). Besides, Lindner (1999) pointed out that children’s academic performance and perceived ability are positively correlated to their sport participation. As a result, physical education could promote not only physical health, but also cognitive and affective wellbeing.

It is believed that many factors contribute to the quality of a physical education lesson. Students’ physical activity level is one of the major concerns of the teaching outcomes. The establishment of more “millennium-designed” schools that provide more outdoor space may promote students to be physically active. However, the correlation between physical spaces and activity intensity is not known. Therefore, this study attempted to determine whether space
may affect students’ activity level during physical education lessons.

In order to determine the students’ physical activity level in physical education class, behavior observation and pedometer measurement were used. The electronic pedometer is useful to provide an objective measure of physical activity (Kilanowski, Consalvi & Epstein, 1999). And behavior observation can offer an accurate method for discriminating activity levels. The cross-methods data collection may give an inter-measure reliability.

Statement of the Problem

The purpose of this study was to investigate the effect of activity spaces on students’ activity level of primary school children in Hong Kong during physical education lessons.

Hypotheses

The hypotheses of this study were as follow:

1. There would be no significant mean difference on the students’ activity level of students having the physical education lessons in “millennium-designed” schools and
in traditional schools.

2. There would be no significant correlation between students' activity levels and relative available spaces for the physical education lessons.

3. There would be no significant mean difference on students' activity levels between inexperienced and experienced teachers.

4. There would be no significant correlation between students' activity levels and lesson contexts on SOFIT scores of management/transition/break, teaching physical fitness knowledge, teaching general knowledge, fitness training, practicing skill, playing game or free playing.

5. There would be no significant correlations between teachers' behavior on SOFIT sub-scale scores of promotes fitness, demonstrates, instructs, manages, observes, and off-task and students' activity levels.

6. There would be a positive significant correlation between
the activity level measured by observation method (SOFIT) and electronic pedometer.

Definition of terms

The following terms were operationally defined as:

"Millennium-designed" school

It refers to those schools built in and after year 2000 and that are physically larger in size when compared to traditional schools. These schools are standardized to have two standard outdoor basketball courts and one covered playground.

Traditional school

It refers to those schools built before year 2000 and the schools are smaller in size as compared to "millennium-designed" schools.

Physical activity

It refers to the movement of human body that results in energy expenditure at different levels above the resting metabolic rate (Anshel et al., 1991).
Physical activity level

In this study, the activity levels of students were measured by the values sum of SOFIT sub-scores of students’ activity and pedometers readings.

Experienced and inexperienced physical education teachers

Experienced and inexperienced physical education teachers were operationally defined as the physical education teachers having more or equals to 10-year experiences or less than 10-year experiences in teaching physical education.

Delimitations

The study would be implemented based on the following delimitations:

1. Six subjects were randomly selected from each class of primary four, primary five and primary six in schools.

2. Both male and female students were selected.

3. Each subject was required to wear a pedometer on his/her right waist during the entire physical education lesson.

4. The subjects were under the observation during the
physical education lesson by the observer.

Limitations

As there were many factors that could affect students’ activity during physical education lessons, but not all of them could be taken into consideration in this study. So, the following limitations were considered when interpreting the results:

1. It was assumed that all subjects performed the same during the observed physical education lesson as any other physical education lessons.

2. The electronic pedometers model “Yamax, Digi-walker SW-700” could only measure steps by the displacement of vertical movement produced. Running and walking movements could not be distinguished.

3. Pedometer measurement might not be accurate due to possible intentional shaking of the instrument done by subjects.

4. It was assumed that the teachers’ behaviors were the same as in any other physical education lessons
without the presence of observer.

5. Lesson topics of each class were not the same, so the teaching strategies may vary, which in turn may affect the students’ activity levels.

6. Weather conditions were not controllable to facilitating favorable constant environments for all classes.

7. Students’ disciplines, which might indirectly affect their time to play, were not controllable.

Significant of the Problem

The main purpose of this study was to investigate the factors affecting students’ physical activity level in physical education class, in particular, the schools’ physical sizes. It was believed that knowing those factors could assist in reaching a better learning physical education environment for students.

In Hong Kong, due to the high density population, sizes of schools are usually below the standards of western countries,
such as United States and Canada. In such learning environment with limited activity space, physical education lessons, in terms of students’ activity levels and teaching outcome, might be compromised. In recent years, many new schools were built in standard form that the physical size of school has been increased significantly. Therefore, the study attempted to determine the effect of activity space on the students’ physical education learning environment in two different types of schools: “millennium-designed” schools and “traditional schools”.
Chapter 2

REVIEW OF LITERATURE

In this chapter, literature are reviewed for giving out a clearer picture of the correlation between children activity level in physical education class of Hong Kong primary school and the factors contribute to it theoretically and empirically. There are five sections in this chapter that arrive at the topic either in general or in particular. The first section introduces the importance of being active in physical education class. The following section presents some theories of motivation and attitude to be active participation or constraints that diminish the participation in physical education lesson.

The third section introduces the factors affecting students’ activity levels in physical education class. Then, the changes in Hong Kong school environment are addressed. And finally, some measuring methods of students’ activity level are introduced for the aim of this study.
Importance of Being Active in Physical Education Class

According to the Department of Health (2002), for every 100,000 populations, 80.7 persons died at heart diseases and 51.8 died at cerebrovascular disease. It was roughly around 26.76% of the total death toll. However, except from inherited reasons (family history), the chance of suffering these kinds of disease could be reduced by having regular sport habits and having a healthy lifestyle (World Health Organization, 2002). Yet, the figure of death toll on these diseases was still relatively significant in Hong Kong. One more evidence was shown as compared to primary students from United States of America, Hong Kong’s primary students, both boys and girls, performed much worse in 9-minutes run and sit-up test results and showed higher subcutaneous fat layer (Hong Kong Childhealth Foundation [HKCF], 2002). Hong Kong children could only get a better result on sit & reach test at age between 6 and 11 (HKCF).

Therefore, the fitness levels
of Hong Kong children were much worse than children in United States.

Why are Hong Kong people physically inactive? Tracking the origins, children’s sporting habits are usually cultivated in school age. Greene and Simons-Morton (1984) found that adults were not interested in sports because of not having positive physical education experiences in adolescence and children-age. One of the aims of physical education in Hong Kong is to encourage children to take part in sports, physical training and recreational activities actively and regularly (The Curriculum Development Council [CDC], 1995). A study has also shown that engaging in adequate physical activity of children is important for their later development on lifelong physical activity (Johnson & Deshplande, 2000). Therefore, introducing sports in school-age is essential to achieve the aim of promoting lifelong participation in physical activities (The National Association for Sports and Physical Education [NASPE], 2002). Additionally, highly active student is one
of the components of a high quality physical education program (Butler, 2003). As a result, promoting regular sporting habits through physical education programs to school-age children is very important.

Constraints and Motivations

Some theories of constraint and motivation are applied to explain the phenomenon of primary students being active or inactive in the physical education class.

Constraints

In this study, two constraints models, hierarchical model and integrated model, were used to try to explain the reasons why students were not active in physical education lessons.

Hierarchical Model. According to Crawford, Jackson and Godbey’s (1991) paper, constraints were encountered hierarchically. There were three stages that affected the participation and one had to be solved before going to the next. The three stages were intrapersonal level, interpersonal level and structural level (Crawford et al).
Integrated Model. After the introduction of the hierarchical model, many scholars argued that the three levels should not undergo stage by stage. Henderson and Bialeschki (1995) later purposed a new model called integrated model, which suggested all factors intervene one another and none of these factors was prior to other.

Motivation

In contrast, motives were the reasons why people join in their activity, act, or behavior. In order to change the children’s mind of escaping from the physical education lessons, their motivation in participation in activities should be boosted up and that motivation should be intrinsic. As children were intrinsically motivated, the sporting habits would be obligated in later life.

To foster intrinsic motivation, some suggestions were given. For examples, freedom of choices should be given to students and there should be no surveillance, as it will increase their perceived freedom (Ajzen, 1985). Also, Flow Theory. The flow theory suggested anxiety would come
out when skills cannot meet challenges, whereas, boredom appeared when tasks were too easy (Mandigo, & Thompson, 1998). The flow only arises from skills if they match the levels of challenge.

Theory of planned behavior. Ajzen (1985) proposed the theory of planned behavior (Appendix A), which estimated three factors that could exert control over a person to or not to perform a behavior. This theory was further modified by Bagozzi and Warshaw (1990). They try to explain the remaining parts of the theory by adding the concept of one’s goal and the past experience to the antecedent factors.

Factors Affecting Students’ Participation in Physical Education Classes

Knowing the predictors of students’ sports participation could assist teachers in finding effective ways for getting students involved in physical activities on the regular basis (Silverman, 1998). Actually, a lot of elements in physical education class, including teachers’ experiences, quality of class managements,
teacher to students' ratio, facilities (both qualitative and quantitative), space, playground improvements, school sport culture and so on, may contribute to the successfulness of the physical education class (Butler, 2003).

Besides, it is found that less than 6% of boys and 2% of girls were physically active outside the physical education classes (Health & Medicine Week, 2002). Hence, the importance of physical education classes is further proved for children to develop their sport participation habits. Three main factors are divided that could influence the participation of children.

**Human Factors**

Teachers are responsible for the planning and supervising of classes. Teachers' behaviors, including teaching strategy, presentation of content, time allocation and etc, could affect the quality of teaching. Therefore, teacher plays an important role in the class.

*Teaching strategy.* There are three teaching styles, namely, teacher-centered, conceptual teaching and
student-centered (or called learner-centered), where teachers see themselves as different roles in different teaching styles (Fung & Chow, 2002).

Physical education lesson in Hong Kong usually includes three parts, warming-up, teaching and practicing of skills and movements and closing activities (CDC, 1988). Owing to the historical background of Hong Kong, the culture was much influenced by the military origin of physical education teacher in United Kingdoms and Europe (Wong, 1995). The teaching part often based on commends and orders form that students follows teachers’ instructions. Therefore, Direct instruction (i.e. teacher-centered) is commonly adopted by teachers in the primary schools in Hong Kong. This teaching method is original from the process-product research of 1970s (Bulger, Townsend, & Carson, 2001). Historically, direct instruction has received a considerable amount of support regarding its effectiveness in a variety of educational contexts (Sweeting & Rink, 1999).

Sweeting and Rink (1999) related the primary characteristics of direct instruction to physical education:
Direct instruction usually involves the selection of clear instructional goals, ... hierarchically sequenced chunks of content, high teacher-centered structure, and immediate, specific feedback on performance. To teach a motor skill directly, the teacher would carefully order a sequence of learning experiences that would lead the learner from where he or she is in performance to mature form and effective use of a pattern. (p. 217)

Despite the substantial amount of empirical support concerning the effectiveness of such models, Rink (1998) suggests that goal outcomes, environmental conditions, and student characteristics are critical variables that an educator must consider when determining whether to employ a teacher-directed or more student-centered approach to teaching. According to Tsangaridou’s (2002) study, student-centered pedagogical strategies were more effective in teaching and building students interested in physical education lessons. However, students were usually blamed, if they lacked of
attention or poor understanding, or they failed to learn (Tsangaridou, 2002).

Planning and Implementation. The rate of learning relates to planning (Butler, 2003). It is easy to understand that poor time management or having students waiting in their turns limit the physical activity in physical education class (Lambert, 2000). Alternatively, some kinds of sport require more energy expenditure. Therefore, the planning of class content affects students’ activity level too.

On the other hand, the attitude of students also affects their activity intensity. Students believe that strong athletic identity could be acquired by taking parts in variety of physical activities (Parker-Pope, 2003).

Self-efficacy. One strong predictor of behavior is the “self-efficacy” that derived from Bandura’s Social Cognitive Theory (Nahas, Goldfine, & Collins, 2003). A person who acquires strong self-efficacy in certain behavior will increase the likeliness of performing the task (Nahas, Goldfine & Collins, 2003).
Enjoyment. Some researchers considered enjoyment being essential to exercise adherence (Nahas et al., 2003). Fun or enjoyment is one of the most important reasons that children participate in sports.

Environmental Factors

Suitable and preferable environment of school could facilitate or hinder the physical activity level of school children (Sallis et al, 1997, 2001). NASPE (2003, para. 2) also emphasized that adequate equipment and facilities are necessary for the assurance of high quality physical education. It is found that four times as many boys and five times as many girls being physically active during free time if better playgrounds are provided in school (Health & Medicine Week, 2002). Butler (2003) states that granted, having enough money to run an effective program is ideal, although it might not be necessary. Furthermore, physical education classes should be taught in appropriate gymnasiums and outdoor field spaces so that physical education could be shaped up (Treanor & Housner, 1999).
In contrast, outside physical education class, poor environment keeps students away from physical activities (Sallis et al, 2001). It is considered that near zero levels of student physical activity was found in lacking environmental support (Sallis et al, 2001). The equipment limitation and large class size might make physical education teacher embrace to narrow selection of sports that reduce student development of interests in participation (Treanor & Housner, 1999).

However, the level of resources committed to the school sector in Hong Kong is not favorable (Johns & Dimmock, 1999). Only about 3% of the Gross Domestic Product (GDP) is allocated, whereas around 5.8% of GDP average across Organization for Economic Co-operation and Development (OECD) countries was committed (Johns & Dimmock).

Hong Kong Situation

It is found that the designs of Hong Kong schools are going to be standardized with which the building site for a newer school is larger than before (Education and Manpower Bureau [EMB], 2002). However, many “traditional” schools can still
be found in Hong Kong and they are in operation (EMB, 2002). Those schools built in mid-50s to 70s are called the "match-box" school because of the small size. Although government spends money for renovation of these schools, the learning environment for physical education may not be encouraging due to limited activity space. Between 70s and late 80s, design of school has been changed to cope with the rapid growth of population and expansion of schooling demand (EMB, 2002). Some schools in operation nowadays still need to share the public basketball court at nearby housing estate. Also, indoor gymnasium is usually absent in most of these schools and therefore, physical education must be conducted, weather permitting, on the outdoor playground area, which often amounts to no more than one or two basketball courts which are often in poor condition (John & Dimmock, 1999). The outdoor field not only diminishes students' interests to physical education, but it also affects children's health because of the poor air quality (John & Dimmock, 1999). At early and mid-90s, the areas of all school sites are standardized to 6,950 sq. meters for secondary schools
and 6,200 sq. meters for primary schools (EMB, 2002). Although the "millennium-designed" schools, which is larger and have two standard basketball courts and a covered-playground, are in use, the number of these schools is not enough, so many "traditional" schools still exist. In stark contrast, American standards suggest that junior secondary schools should be located on a site that consists of 10 to 20 acres while secondary schools range from 10 to 40 acres (Bucher & Krotee, 1998). In other words, American schools may have five to twenty times more spaces than Hong Kong schools. However, the number of students of Hong Kong is not five to twenty times less than American schools (John & Dimmock, 1999).

Besides, Government Planning Department denotes that schools should be built away from areas affected by significant noise and sources of air pollution (John & Dimmock, 1999). Unfortunately, these conditions are almost impossible to implement in Hong Kong situation because of the high population density (John & Dimmock). Sparkes (1991) described "Teachers, trapped in the situational and social constraints of schools,
adopt coping strategies which tend to be reproductive rather than creative’” (p. 3). In term of resources, it is found that the absence of school gymnasiums, confined space for physical activity, and lack of equipment are a few examples of influencing factors of quality physical education in many primary schools in Hong Kong (John & Dimmock, 1999).

Furthermore, physical education classes are usually offered either twice a week in 30 to 35-minute sessions or a single 60 to 70-minute double period, whereas the American standard suggests daily physical education (NASPE, 2003). Time allocation is far less than Western countries, so physical education teachers in Hong Kong need to maximize the usage of time for quality teaching and student learning.

Measuring Physical Activity

SOFIT. System for Observing Fitness Instruction Time (SOFIT) is used to measure the activity level of students, class context and teachers’ behavior of physical education class by observation simultaneously during physical education lessons (Appendix B). This method is validated by both heart
rate monitors and CALTRAC and TriTrac accelerometers (McKenzie, 2002). Categories of teachers' behavior and lesson contexts are developed from common definitions in physical education evaluation research (McKenzie, 2002). A computer paces observations using standard 10-second recording method (McKenzie, 2002). For every 10-second period, the observer needs to follow a signal cue to start observing the lesson on the aspects of students' activity, lesson context and teachers' behavior for the whole 10-second period. Another signal cue will notify the observer to jot down his/her observations. Therefore, it allows observer to observe the class half of time. This method has been used for the assessment of over 1,000 schools throughout the United States (McKenzie, 2002).

**Pedometry.** Pedometry is one of the methods that could measure all types of walking movements by using a pedometer (a small electronic device) that attach to the waistband of a pair of short or pants (Appendix C). Steps of running movements could also be recorded with less accuracy (Morgan,
According to Morgan et al (2003), the average number of steps taken of 300 school children in a 30-minute physical education class should be about 1,600 for boys and 1,300 for girls. These numbers identified adequate activity in the physical education lesson (Morgan, 2003). That meant lesser than these data could be identified as inactive participation in physical education lessons.

Summary

Physical education is important for children to develop healthy lifestyle and maintain physically active throughout their life. Therefore, a quality physical education should be promoted. There are possibly many constraints and barriers that may limit the quality of teaching physical education in Hong Kong, such as the inadequate provision of sporting facilities in schools. There are lack of indoor gymnasiums, adequate activity spaces and equipment in most of Hong Kong schools (John & Dimmock, 1999). The recent construction of new schools with bigger size might solve at least the constraints with respect to inadequate activity
space. The aim of the present study was to determine the relationship between students' activity levels and available physical area for the activity in physical education lesson.
CHAPTER 3

METHOD

Classes of primary four, primary five and primary six were randomly selected from seven schools. Six subjects were randomly selected in each class with three male and three female students, except boys' or girls' classes that in single-sex schools. They were asked to wearing pedometers and colored strips during the physical education lessons. The name of the seven schools were Hong Kong Student Aid Society Primary School, Alliance Primary School Kowloon Tong, Ho Lap Primary School, Wong Tai Sin Catholic Primary School, Holy Cross Lutheran School (PM), FSFTF Fong Shu Chuen Primary School, and STFA Wu Mien Tuen Primary School. Among these schools, two were “millennium-designed” schools and the rest were traditional schools. Six classes, two from primary four, two from primary five and two from primary six, were observed in “millennium-designed” schools and nine classes, two from primary four, four from primary five and three from primary six, were observed in traditional schools. All the observed
classes were taught by a total of seven male and three female teachers separately. The duration of physical education classes ranged from 16 to 46 minutes with a mean of 24.4 minutes ± 7.89. The teaching content for the observed classes was all skill-related focusing on basketball, volleyball, track and field, and softball.

Collection of Data

Observation method (SOFIT) and electronic pedometers were used for the data collection in this study. SOFIT was designed by McKenzie, Sallie and Nader in 1991 (see appendix A). It provides a measurement for students' activity level, teachers' behavior and lesson context during physical education lesson (McKenzie, 2002). SOFIT involves direct observation of lessons by trained observer. And reliability was checked by correlation of data collected by different observers.

Pedometers were attached to subjects’ right waist. They were requested to carry the pedometers during the whole lesson. The readings were recorded at the end of lessons, excluding
traveling time between classroom and playground.

Data Analysis

Statistical data were analyzed by Statistical Package for Social Science Version 11.0 (SPSS 11.0). Descriptive data, such as mean, standard deviation and frequencies were worked out. Independent t-test was computed for the analysis of the differences of students' activity levels between "millennium-designed" schools and traditional schools. Also, the same test was applied in the investigation of activity levels between experienced and inexperienced teachers. On the other hand, Pearson product-moment correlation (r) was used for the analysis of the relationship between sub-scale scores of teachers' behavior and students' activity scores: i.e. scaled from one to five, indicating their current activity as scores 1 identified they were lying down, scores 2 identified they were sitting, scores 3 identified they were standing, scores 4 identified they were walking/performing activities that the energy expenditure was slightly higher than standing, and scores 5 identified they were very active. Moreover, the
same test was used for determine the relationships between
SOFIT sub-scale scores on lesson contexts and students’
activity levels. Correlation between SOFIT scores on
students’ activity levels and pedometer readings were computed
with Pearson product-moment correlation. All students’
activity scores of SOFIT were calculated and interpreted in
terms of total mean scores. Similarly, the mean of total sum
of pedometer readings of the six subjects in each class was
computed for further analysis.
CHAPTER 4

ANALYSIS OF DATA

This chapter aimed to analyze the data collected to further investigate the relationships between physical activity level and the related factors during physical education lessons. Teachers’ experiences and available spaces for students were taken into account for checking the correlation of activity levels. Differences of students’ activity levels among schools were interpreted by the available spaces for students to move in physical education lesson.

Background Information

Sample size

There were totally 51 boys and 39 girls sampling from a total 516 primary students in 15 classes of seven primary schools in Hong Kong. The seven primary schools were categorized into two types: “millennium-designed” schools and “traditional” schools. There were two primary four classes, two primary five classes and two primary six classes from two “millennium-designed” schools and two primary four classes,
four primary five classes and three primary six classes from five “traditional” schools. The distribution of classes of two types of schools was presented in figure 1 and the distribution of gender and primary levels of observed subjects were presented in figure 2.

Figure 1. A histogram of classes’ distribution between “millennium-designed” schools and “traditional” schools (n = 15 schools)
Numbers of Participants

Primary and Gender

Percentage of average time spent on students’ activities

Figure 2. Histogram of primary Grade and gender distribution of the participants (n = 90)

The percentages of average time spent on students’ activities were shown at figure 3. It was found that students spent most of their time on standing (48%) and walking (20%) in the physical education lessons.
Figure 3. A pie chart of percentages of average time of students spent on different activities.
Percentage of average time spent on lesson contexts

The percentages of time spent on skill practice, management, teaching fitness knowledge, fitness training, playing game, teaching general knowledge, and others were 33%, 26%, 16%, 13%, 12%, 0% and 0% respectively. The results showed that physical education teachers, on average, used slightly more than one third of time on practicing skills and one fourth of time on management/transition/break. However, time for playing game just occupied 11% of the total time in physical education lesson. The average percentages of time were shown at figure 4.
Percentage of average time spent on teachers’ behaviors

The percentages of average time spent on teachers’ behaviors were shown at figure 5. It was found that giving general instructions occupied more than half of the time of lesson (55%). And the teachers spent more than one fourth of time (27%) on managing the class or preparing the lesson.
Figure 5. A pie chart of the percentages of average time spent on teachers’ behaviors during a physical education lesson.

**Teachers’ experiences**

There were seven male teachers and three female teachers conducting all 15 classes in this study. The ranges of teaching experiences on physical education were from 3 to 34 years with a mean of 11.60 years ± 8.84. And teachers were divided into two groups: experienced (five teachers) and inexperienced (five teachers). It was demonstrated at figure 6.
Lesson Topics

Five types of sport skills were taught in these 15 classes. There were eight “track and field” classes, three “basketball” classes, one “gymnastics” class, two “volleyball” classes and one “softball” class. It was observed that more than half of lesson contents were “track and field” classes.
Results

Hypothesis 1

In order to check the null hypothesis of the students’ activity levels during physical education lessons between in “millennium-designed” schools and “traditional” schools, the independent-\( t \) test was used to compare the mean differences of physical activity level between students studying in “millennium-designed” schools and in traditional schools. Results were shown in Table 2 and Table 3. It was found that there was no significant mean difference on the physical activity level between these two types of schools with the measurement of SOFIT scores (\( t = -0.554, \ p < 0.05 \)) and pedometer readings (\( t = 1.273, \ p < 0.05 \)).
Table 2

Independent *t*-test of physical activity level (SOFIT) between students studying in “millennium-designed” schools and traditional schools (n = 15 schools)

<table>
<thead>
<tr>
<th>School type</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Mean difference</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millennium-designed schools</td>
<td>6</td>
<td>10.08</td>
<td>1.29</td>
<td>-0.02870</td>
<td>-0.554</td>
<td>0.082</td>
</tr>
<tr>
<td>Traditional schools</td>
<td>9</td>
<td>10.37</td>
<td>0.72</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3

Independent *t*-test of physical activity level (Pedometer: step per minute) between students studying in “millennium-designed” schools and traditional schools (n = 15 schools)

<table>
<thead>
<tr>
<th>School type</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Mean difference</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millennium-designed schools</td>
<td>6</td>
<td>55.11</td>
<td>11.02</td>
<td>6.60</td>
<td>1.273</td>
<td>0.225</td>
</tr>
<tr>
<td>Traditional schools</td>
<td>9</td>
<td>48.51</td>
<td>9.03</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Hypothesis 2**

The relationship between activity levels and physical free spaces for physical education lessons was evaluated by Pearson product-moment correlation and the result was presented in Table 4. No significant correlation was found between these two factors (SOFIT: $r = 0.054$, $p > 0.05$; Pedometers: $r = 0.030$, $p > 0.005$). That meant the available spaces were not correlated with the students’ activity levels.

**Table 4**

*Pearson’s Correlation Coefficient of students’ activity levels and spaces for physical education lessons (n = 15 classes)*

<table>
<thead>
<tr>
<th>Spaces for the lessons</th>
<th>Total activity scores by SOFIT</th>
<th>Total steps count per subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R$</td>
<td>0.054</td>
<td>0.030</td>
</tr>
<tr>
<td>$P$</td>
<td>0.856</td>
<td>0.919</td>
</tr>
</tbody>
</table>
Hypothesis 3

The independent-t test was carried out to determine the effects of teachers’ experiences on students’ activity levels. From the results, there were no significant mean differences on students’ activity between experienced and inexperienced teachers ($p > 0.05$). Therefore, experiences of teachers had no effect on with students’ activity levels.

The results were listed in table 5 and table 6.

Table 5

Independent t-test of students’ physical activity levels between students taught by experienced and inexperienced teachers on SOFIT measurement ($n = 15$ classes)

<table>
<thead>
<tr>
<th>Teachers’ experiences</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Mean difference</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experienced</td>
<td>8</td>
<td>282.13</td>
<td>115.62</td>
<td>-63.13</td>
<td>-1.264</td>
<td>0.228</td>
</tr>
<tr>
<td>Inexperienced</td>
<td>7</td>
<td>219.00</td>
<td>67.58</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6

**Independent t-test of students’ physical activity levels between students taught by experienced and inexperienced teachers on pedometers (step per minute) measurement (n = 15 classes)**

<table>
<thead>
<tr>
<th>Teachers’ experiences</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Mean difference</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experienced</td>
<td>8</td>
<td>55.64</td>
<td>8.371</td>
<td>-9.62</td>
<td>-2.048</td>
<td>0.061</td>
</tr>
<tr>
<td>Inexperienced</td>
<td>7</td>
<td>46.02</td>
<td>9.833</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hypothesis 4**

The relationship between students’ activity levels and sub-scores of lesson contexts was shown at Table 7. From the SOFIT sub-scores of student activity, it was found that three kinds of lesson contexts, management or transition ($r = 0.594, p < 0.05$), teaching general knowledge ($r = 0.591, p < 0.05$) and times for skill practice ($r = 0.624, p < 0.05$) were correlated positively and significantly with students’ activity levels. For the pedometer measurement, a significant positive correlation was found between times for skill practice and students’ activity levels ($r = 0.725, p < 0.01$). The results
suggested the more time allocation for management/transition, teaching general knowledge and skill practice, the higher the physical activity levels of the students.

**Table 7**

*Pearson’s Correlation Coefficient of lesson context sub-scores and students’ activity level (N=15)*

<table>
<thead>
<tr>
<th></th>
<th>Total steps count per subjects</th>
<th>Total activity scores by SOFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( r )</td>
<td>( p )</td>
</tr>
<tr>
<td>Management/Transition</td>
<td>0.594*</td>
<td>0.019</td>
</tr>
<tr>
<td>General Knowledge</td>
<td>0.591*</td>
<td>0.020</td>
</tr>
<tr>
<td>Physical Fitness</td>
<td>0.184</td>
<td>0.512</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness Training</td>
<td>-0.202</td>
<td>0.469</td>
</tr>
<tr>
<td>Skill Practice</td>
<td>0.624*</td>
<td>0.013</td>
</tr>
<tr>
<td>Game Play</td>
<td>0.021</td>
<td>0.940</td>
</tr>
<tr>
<td>Others</td>
<td>0.197</td>
<td>0.482</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

* Correlation is significant at the 0.05 level (2-tailed).

**Hypothesis 5**

Table 8 showed the relationship between students’ activity levels and the sub-scores of teachers’ behavior in SOFIT recording by Pearson correlation. From the result, students’
activity levels, in terms of SOFIT and pedometer measurements, were positively and significantly related to teachers' instructional behavior in the lessons (SOFIT: $r = 0.790$, $p < 0.01$; Pedometers: $r = 0.836$, $p < 0.01$). The scatter plots of activity level and teachers' instructional behavior were shown at figure 7. Therefore, the more instructions the teachers give in lessons, the more active the students.
Table 8

Pearson’s Correlation Coefficient of teachers’ behavior sub-scores and students’ activity level (N=15)

<table>
<thead>
<tr>
<th></th>
<th>Total steps count per subjects</th>
<th>Total activity scores by SOFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( r )</td>
<td>( p )</td>
</tr>
<tr>
<td>Promotes fitness</td>
<td>-0.309</td>
<td>0.262</td>
</tr>
<tr>
<td>Demonstrates</td>
<td>0.072</td>
<td>0.798</td>
</tr>
<tr>
<td>Instructs</td>
<td>0.836**</td>
<td>0.000</td>
</tr>
<tr>
<td>Manages</td>
<td>0.360</td>
<td>0.187</td>
</tr>
<tr>
<td>Observes</td>
<td>0.231</td>
<td>0.408</td>
</tr>
<tr>
<td>Off-task</td>
<td>-0.005</td>
<td>0.985</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)
Figure 7. The scatter plots between activity level and frequency of instructions given by teacher

Hypothesis 6

The Pearson product-moment correlation between activity levels of SOFIT sub-scores on students’ activity and pedometer readings was shown in Table 9. The results showed that there was a positive significant correlation between these two measurements ($r = 0.829$, $p < 0.01$). It indicated that the higher
students’ activity scores in SOFIT, the higher readings in pedometers. This result affirmed the validity of pedometer in measuring activity using observation score as a criterion measure since the correlation was greater than 0.60, which is the minimum acceptable correlation coefficient for establishing criterion related validity (Cramer, 2003).

Table 9

Pearson’s Correlation Coefficient of SOFIT scores on students’ activity levels and pedometer readings (N=15).

<table>
<thead>
<tr>
<th>Total activity scores by SOFIT</th>
<th>Total steps count per subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>0.829**</td>
</tr>
<tr>
<td>p</td>
<td>0.000</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (1-tailed)

Discussion

Result description and explanation

In this study, SOFIT and pedometers were used to collect the activity levels of students during the physical education lessons. As the data showed a significant correlation between
SOFIT sub-scores on students' activity and pedometer readings, it illustrated that pedometer was a valid measure of activity level in physical education lessons.

From the result, the relationship between school types (millennium-designed and traditional schools) and students' activity levels was not significant. Although, numerous readings suggested that a better physical environment, in this situation, that was the millennium schools, could enhance children activeness in physical education lessons (Sallis et al, 1997, 2001; Treanor & Housner, 1999), it was not the case in this study. Actually, it could be explained by the limited utilization of the available ground. In most cases, the physical education teachers did not use the whole playground for the lesson. Instead, from observations of the three out of the six lessons in two millennium-designed schools, teachers used only one out of two basketball courts because the other court was occupied by another class. Moreover, one class of "millennium-designed" schools was conducted in the covered playground that the size was even smaller than a standard
basketball court. On the other hand, a lesson in the millennium-designed school was conducted in one out of two basketball courts, even though another court was vacant. Therefore, in all classes, the maximum physical size of the lesson used in the millennium-designed schools was equal to a standard basketball court. It might be explained that physical education teachers used a smaller space for ease of managing students’ discipline. Nevertheless, the primary six class of Alliance Primary School Kowloon Tong utilized half of the public soccer court inside the park at the Oxford Road that the physical size of the playground was the biggest among all. Yet, the activity levels of students were not the highest. Therefore, extra available spaces could not induce students in vigor. The present study contradicted with previous findings. However, one fact should be noted that although extra spaces were provided, the student number for the physical education lessons in Hong Kong is still much larger than the western standards. Therefore, the effect might not be significant. More than that, the teaching strategies and
methods in Hong Kong primary schools were different from teachers from western countries. That might also decrease the influencing effect of available of more spacious area on students' activity levels. Many teachers seemed to adopt the teacher-centered pedagogical strategies, which students needed to follow all instruction given by the teachers. For some instances, teachers stopped all students' activities so as to discipline misbehavior of a group of students. For that reason, the engagement of active participation in physical activity by the students was inhibited.

Furthermore, the experiences of teachers did not influence students' activity levels. The difference between students' activity levels in a lesson conducted by a teacher having more or less than ten years experiences was not significant. Actually, the "most" inexperienced teacher in this study had three-year teaching experiences in the physical education subject. In addition, Metzler and Tjeerdsma (1998) found that there was no evidence showing the correlation between teaching effectiveness and teachers' qualifications. Although Manning and Payne (1996) found
that experiences of a teacher might affect three aspects on mental decisions, it was found in novice teachers only, whom were teaching physical education at first year. On the other hand, O'Bryant, O'Sullivan and Raudensky (2000) suggested the commitment to work and enjoyment when getting along with children was important for a physical education teacher instead.

In contrast, teacher behavior could bring higher activity levels of students. As shown in table 7, both SOFIT and pedometer data demonstrated that teachers giving more instructions in class, students were found to be more active. Sallis et al (2001) made similar conclusions that children would be physically active, if they were closely monitored. Hence, more instructions given by teachers might induce an atmosphere in promoting students to be more physically active in the lessons.

Besides, some types of lesson contexts were found positively correlated with students’ activity. More frequent time spent on management/transition and skill practice can promote students’ activity levels is logical, because students were either standing in the queues on transition time or
performing the skills in skill practicing time that causes higher energy expenditure. However, it was quite odd to see the correlation between general knowledge and students' activity levels. One possible reason was the knowledge teaching might associate with new skills, which might bring challenge to them. According to flow theory, a challenging task would increase students' interest and motivation in performing the task. Thus, their activity levels boosted up.

**Limitation and possible errors**

Although the result showed significant correlation between data of pedometer and SOFIT, pedometer readings were not very accurate. It is because pedometers should be calibrated before use as the distances of steps of every individual were different. But, due to the time limits, it was impossible to calibrate the pedometers for each measurement. Instead, the approximate distances per steps at the age of primary four to primary six students were pre-set.

Actually, in this study, only limited factors could be considered for the effect on activity levels of students. Yet,
the importance of other factors could not be eliminated in this study. For example, teacher-student relationship should be taken into consideration, as it was an interpersonal factor that either promote or inhibit the activity levels of students. According to integrated model of constraints, it could be predicted that students encountered with this interpersonal level of constraint would result in termination of or decrease in active participation in physical education lesson.

Likewise, students' self-efficacy and enjoyment also affect students' participations. If they lack of self-efficacy or enjoyment in that lesson, they might come across with the intrapersonal constraint, which is defined as the first priority of constraint to be met when a person plan to execute a task in hierarchal model of constraints. Once this restraint could not be solved, students' would be inactively participated.

Nevertheless, students' activity levels could be enhanced by increasing their motivation. In order to increase their motivation, teacher could try to help them achieve flow
experiences. Mandigo and Thompson (1998) proposed that motives for participation could promote adherence to physical activity. Students’ engagement would increase when they perceived challenge of the task and their own skills were high and in balance, the instruction was relevant, and the learning environment was under their control (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003).

Weather was one of the factor that might affect students’ participation, especially in very hot or very cold conditions. One observed class was on the highest temperature with nearly 30 degree Celsius and the class was conducted in outdoor area with direct sunlight, which might induce an unflavored learning environment to students. Although extreme cold was
not encountered in this study, it would reduce students’ activity level, too.

Besides, students’ interests might be influenced by different lesson topics. If lesson topics are matched with students’ interests, students’ engagements may be enhanced due to the increase in enjoyment, and vice versa.

Different length of lesson periods also had an effect on both the students’ activity level and lesson contents. The percentage of warm-up and cool-down might vary very differently. And, the percentages of time allocated for game play and skill practice, which students were active, and teaching knowledge or skill, which students were usually sitting down, were different due to the duration of the lesson. A long period of time was supposed to favor the activity levels of students in this study.

On the other hand, the presence of observer drew attentions of some students or some of them might be more active than usual. The disruptions or enhancements of students’ usual activity would change the normal activity pattern of students.
To solve this, video recording could be used, instead of real
time observation. And a hidden camera for recording is
recommended as it minimizes the disturbance. Also, video
recording provides another benefit that the same class could
be re-assessed for a more precise observation.

Although the maximum size of the physical area of each lesson
was recorded, the time spent on relative sizes of different
activity areas should also be taken into account. Simply
considering the maximum size of the physical area may not truly
reflect the utilization of the physical area during the physical
education lesson. Thus, the average physical area usage should
be considered, instead of the maximum spaces being used.

Finally, some other factors might also affect the results’
reliability. For example, parents’ education levels,
students’ lifestyles and school sport culture in each school
might vary a lot. But it is impossible for measure all the
relevant factors in this study.
CHAPTER 5

SUMMARY AND CONCLUSIONS

The summary and conclusion of the study on the physical activity level of students between "millennium-designed" schools and "traditional" schools in physical education lessons and relevant factors affecting students' activity are listed below.

Summary of Results

This study attempted to investigate the relationship on the students' activity levels between the "millennium-designed" schools and traditional schools in physical education lessons. Besides, part of relevant factors, such as physical size of playground, teachers' experiences, lesson contents, and teachers' behaviors, that might affect students' activity levels are taken into consideration when examining the relationship between them.

A total number of 90 students (51 boys and 39 girls), sampling from 516 students from seven schools, were observed and their activity levels were recorded in the study during
the physical education lesson. Teachers’ behaviors and lesson contents were also observed and recorded by pencil-and-paper using SOFIT scale. Students were required to wear the pedometer during the whole physical education lesson. In addition, colored strips were used to identify students being observed in the test.

The present study showed that there was no significant mean difference on the students’ physical activity level between these two types of schools (millennium-designed schools and traditional schools) ($p > 0.05$). No significant correlation was found between available spaces and students’ activity levels too ($p > 0.05$).

Besides, the results showed that there was no significant mean difference of students’ activity levels when classes were taught by experienced and inexperienced teachers ($p > 0.05$). This result indicated that teachers’ experiences had no effects on students’ activity levels.

On the other hand, SOFIT lesson contents’ sub-scale scores on management, general knowledge and skill practice were
positively correlated to students' activity level. The Pearson's correlation coefficients were 0.594, 0.591 and 0.624 respectively for SOFIT measurement ($p < 0.05$). For students' activity levels, in terms of pedometer readings, a significant positive correlation was also found between skill practice and the activity levels ($r = 0.725, p < 0.01$).

One type of teachers' behavior was found to be positively correlated with the students' activity levels, i.e. instructs generally (SOFIT: $r = 0.790, p < 0.01$; Pedometers: $r = 0.836, p < 0.01$). The result indicated that the higher frequency of general instructions given by teacher, the higher students' activity level.

Furthermore, the results also indicated that there was a positive significant correlation between the two measurement methods adopted in this study, i.e. SOFIT and Pedometer ($r = 0.829, p < 0.01$). Using SOFIT as a criterion measure, the validity of pedometer measurement of activity level was established.
Conclusions

Conclusions are made based on the results and shown as the followings:

1. There is no difference of activity levels of students in physical education lesson between students in “millennium-designed” schools and students in traditional schools.

2. The study shows that there is no relationship between students’ activity levels and relative available spaces.

3. Teachers having more than 5 year experiences on teaching physical education do not make any difference on students’ activity levels with teachers having less than or equal to 5 year experience.

4. The more time allocated for management/transition/break, teaching general knowledge and skill practice, the higher students’ activity levels. But other lesson contents, teaching physical fitness knowledge, fitness training, playing game or free playing have no relationship with students’ activity levels in physical education lesson.
5. The higher frequency of general instructions given by teacher, the higher students’ activity levels. 
Promoting fitness, demonstrations, managing, observing, and off-task behavior by the teacher have no relationship with the students’ activity levels in physical education lesson.

6. The higher SOFIT sub-scale scores on student activity, the higher readings of pedometers. The high relationship affirms the validity of the pedometer measuring method by using SOFIT as the criterion.

Recommendations for Further Studies

In this study, only 90 students sampling from 516 students in 15 classes from seven schools were observed. The relationship between physical spaces and students’ activity levels might not be accurately measured. In order to obtain a more significant and reliable result, a larger sample size is recommended.

Moreover, in this study, five different topics were taught in 15 classes. The comparison on different lesson topics could
yield inaccurate result as different sports require different skills and movements. For instance, students were usually more stationary when having a gymnastics lesson than a basketball lesson. Comparing these different natures of lesson could cause significant differences of students' activity levels. Therefore, it is suggested to make comparison between similar class topics.

Lengths of lesson period in this study varied from 16 minutes to 46 minutes, which the percentages of time allocation of lesson contents were affected by the lesson length. The reduction in time allocated for certain lesson contents could result in decreasing activity level. For that reason, classes with similar duration should be used for interpreting the results.

Under the technical problems, this study cannot evaluate the teaching strategies. Actually, different kind of teaching strategies, such as disciplinary or laissez-faire type of teaching, could make a very different result of students' activity levels. Different teaching methods might also have
the differential effect on the different available physical spaces. Further, even though the same teaching strategy is used, the teaching details of different teachers will be different. Therefore, more observations should be carried out under the teaching of the same teachers.

Owing to the time limited, factors that need longer observation time, such as school climate on sport/physical activity participations (Rovegno, 1994), were not be examined. However, it is obvious to see that these kinds of antecedent issues will affect the activity levels of students in the physical education lesson. System for Observing Play and Leisure Activity in Youth (SOPLAY) may be employed for observing students’ activity before schools, in recess and after schools for a primary measure of the schools climate on physical activity involvement.

To conclude, if available, a pre-and-post test set up with larger sample size is recommended to give a more accurate result. In the test, more factors should be taken into considerations, including teaching strategies, lesson duration, school culture,
lesson topics and weather. For the pre-test, smaller spaces are used, but larger spaces should be utilized in the post-test. The lesson topics, teaching strategies and durations, and weather condition should be similar and conducted by the same teacher. Different teaching strategies or lesson topics may be used for another set of testing. Hence, within a test, more factors will keep controlled and between tests, the inter-correlation between factors could be determined.
References


Appendix A

Diagrammatic Presentation of
Theory of Planned Behavior (Ajzen, 1985)
Appendix B

SOFIT

P School- Class ( ) Type: B/G/co Date ( ) Time Start ( ) Time End ( )

Total Lesson Length (___min., ___sec.)

No. of Students: ___ Location: O/I/B

Teacher’s Name: ( )
Teacher’s Gender: Male/ Female

No. of year in PE teaching _____ years

School Size: ______ sq. meter/ sq. feet (L/M/S)

Main Topic: track field, basketball, gymnastic, football or others: __________________________

---

Phase 1: Student Activity decision


---

Phase 2: Lesson Context decision (at least 51% of the std.)

General content (M): transition/ management/ break

knowledge: Physical fitness (P); General knowledge (K); rules/ strategy/ social behavior/ technique

motor:  

Fitness (F); Skill practice (S); Game play (G); Others (O)

---

Phase 3: Teacher Involvement decision

(P) Promote fitness (prompts, encourage, praises) (D) Demonstrates fitness (I) Instructs generally (M) Manages (O) Observe (T) Off-task

---

<table>
<thead>
<tr>
<th>Interval</th>
<th>Student’s no.</th>
<th>Student Act.</th>
<th>Lesson cont.</th>
<th>Teacher behavior</th>
<th>Remark:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>1  2  3  4  5</td>
<td>M K P F S G O</td>
<td>P D I M O T</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>39</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>41</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>44</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>46</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>47</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>49</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
# SOFIT SUMMARY SHEET

<table>
<thead>
<tr>
<th>Date</th>
<th>School</th>
<th>Grade</th>
<th>Teacher</th>
<th>Observer</th>
<th>Re lobs</th>
<th>No. of students</th>
<th>Lesson length</th>
<th>Total observed interval</th>
</tr>
</thead>
</table>

### Student behavior

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. lying down</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. sitting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. standing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. walking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. very active</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Lesson context

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Management (M)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General knowledge (K)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical fitness know (P)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitness activity (F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill practice (S)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Game play (G)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (O)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Interactions

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotes fitness (P)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrates fitness (D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General instruction (I)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manages (M)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observes (O)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other task (T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Special notes:**

---

---
Appendix C

Pedometer model "Yamax, Digi-walker SW-700"