

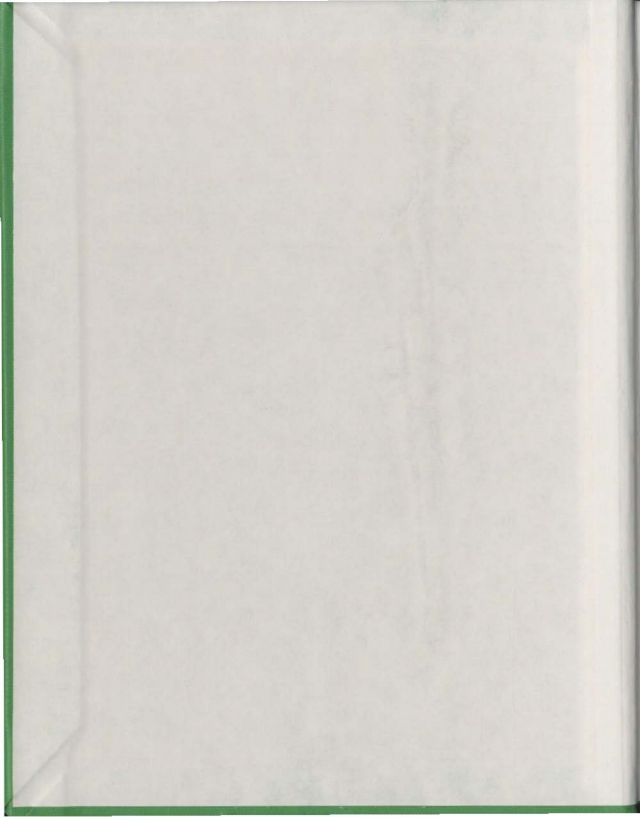
THE DEVELOPMENT OF AN OBSERVATION  
INSTRUMENT TO MEASURE ACTIVITY  
LEVEL OF KINDERGARTEN CHILDREN IN  
PHYSICAL EDUCATION

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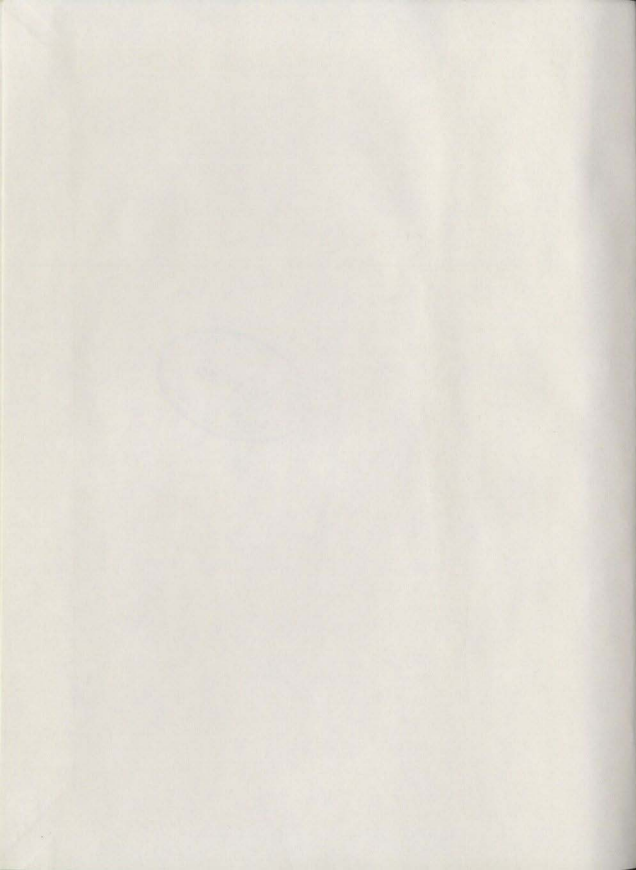
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THE DEVELOPMENT OF AN OBSERVATION INSTRUMENT  
TO MEASURE ACTIVITY LEVEL OF KINDERGARTEN  
CHILDREN IN PHYSICAL EDUCATION

by

© Sheila Anderson, B.S. Phy. Ed.

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Physical Education

School of Physical Education and Athletics  
Memorial University of Newfoundland

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## ABSTRACT

The primary purpose of this study was the development of a technique for assessing the activity behaviour of children at the Kindergarten level in physical education.

The original intent of the study was the development of a remediation program for those individuals who exhibit a degree of participation insufficient for physiological benefit. As no observation instrument was available to identify such children, it was necessary to develop such an instrument. Hence, this study concerned itself with the development of an observation instrument to measure the activity level of Kindergarten children in physical education.

The subjects were 39 first year (Kindergarten) students of Virginia Park Elementary School, St. John's, Newfoundland, of whom 19 were girls and 20 were boys. The subjects were randomly assigned to groups ranging in size from four to seven, and were observed in a free play setting. In addition, the subjects were videotaped throughout the observation period to allow future viewings of the subjects, and the use of such observations for further study and comparison with "real time" observations.

Individual subjects were observed consecutively for five second intervals followed by "free" five second intervals for recording and location of next subject by

observers. Twelve five second observations of each subject's activity level were recorded.

Four categories of activity were defined and rated: inactive, minimally active, moderately active and vigorously active. The observation instrument was initially used to rate the activity level of two groups of subjects by three observers. Refinements were then made to the instrument and it was used to rate a further five groups of subjects by two observers.

Results indicate that the observation instrument developed in this study was a valid (.88), objective (.89) and reliable (.87) method for assessing the activity level of subjects at a Kindergarten level using a free play situation. In addition, the instrument appeared usable by a physical education teacher in a regular class situation, and required a minimum of time, equipment, and observer training.

## ACKNOWLEDGEMENTS

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## CHAPTER I

### INTRODUCTION

The past decade has seen concentrated efforts on the part of government, private agencies and educators to increase public awareness of the need for vigorous physical activity to promote physical fitness.

Optimal function of the human body can only be achieved by regularly exposing the heart, circulation, muscles, skeleton and nervous system to some loading, that is to say, physical work... Too often even our leisure time is spent watching rather than doing. Our lifestyle has changed to such a degree that it now seems to be dominated by lying, sitting and riding. (Bailey, 1975)

Social and technological changes in Canada have contributed to a lifestyle that has proven costly and debilitating. The Province of Ontario study, entitled "The Relationship Between Physical Fitness and the Cost of Health Care", concluded that

Higher levels of physical fitness are associated with lower medical claims. An estimated yearly reduction of \$31 million in medical claims in Ontario could be expected if all adults had at least an average level of physical fitness.

An estimated reduction of \$13 million in expected costs for coronary heart disease in Ontario could be expected if all those in this age group (35 to 64) had at least an average level of physical fitness. (Kelly and Mednick, 1976)

Governments have also become involved in the "fitness boom", as evidenced by the aforementioned study.

and the 1977 Provincial Fitness Conference sponsored by the Government of Newfoundland and Labrador. From this conference came a list of 46 resolutions recommending increased emphasis on physical fitness and physically active lifestyle. (Government of Newfoundland and Labrador, 1977)

Perhaps Participaction has done more than any single agency to create public awareness of the need for physical fitness and to subtly encourage the average Canadian to become involved in physical activity or physical fitness awareness. Participaction is a private, non-profit, federally supported agency established in 1971 as "Sport Participation Canada" for the promotion of personal fitness. Their media approach to increasing awareness of physical fitness is unique and has done much to improve the population's attitude towards physical activity.

Many undesirable physiological effects have been attributed to physical inactivity. Jean Mayer, (1973) professor of nutrition at Harvard University believed it to be a likely cause of obesity in adults and children, and of coronary disease and atherosclerosis. Bailey (1973) supported Mayer's view that obesity is linked to physical inactivity. Houston (1981) stated that physical inactivity had a harmful effect on bone shape and mineralization, while Anderson, Rutenfranz, et al. (1978) suggested that physical inactivity may in part, be responsible for various other disabilities of the joints, ligaments, and connective tissues, including

back pain. Increased physical activity was seen to be beneficial for diabetic children and adults, and supervised muscle training was seen to be beneficial to patients suffering from disorders of the bones and joints. (Anderson, K. L. et al. 1978)

Children, as well as adults have been the focus of this fitness era, and during the seventies, "physical activity and the young child" has been the target for numerous conferences, studies, and research. Notable among these have been the National Conference on Fitness and Health, Ottawa, 1972 recommending more activity time and improved physical education programs; A specific recommendation for daily physical education was made at "The Child in Sport and Physical Activity" conference held at Queen's University in 1973. A position paper presented by the Canadian Association for Health, Physical Education and Recreation recommended daily physical education for every elementary school child in Canada, and in 1976 recommended through its New Perspectives specific improvements in physical education programs. (Martens and Grant, 1980). The General Assembly of the Canadian Medical Association and the Canadian Association of University Women (Robbins, 1978), supported these views.

Most significant of Canadian studies was that undertaken by Dr. D. Bailey, (1973) Entitled, "The Saskatchewan Child Growth and Development Study" (a longitudinal study of physical fitness from 1964 to 1972).

Bailey conducted tests involving over 100 measures taken on 150 boys and 100 girls to assess strength, suppleness and aerobic power. On the basis of his results he states,

For the ordinary Canadian child (not the athlete or the exceptionally skilled, but the ordinary boy) physical fitness as expressed by aerobic power, factoring out size, seems to be a decreasing function from the time we put him behind a desk in our schools. (Bailey, 1973)

In yet another study, Shephard (1969) concluded that lack of activity and poor level of cardiorespiratory fitness were more prevalent among girls than boys. His study involved a sample of 70 ten to twelve year olds in the Toronto area.

Metivier (1976) concluded that people who participated in physical education in school were more likely to continue as adults to be physically active, and that high school students who were exposed to physical activity in elementary school had a better attitude toward physical exercise than those who did not participate as young children.

Despite scientific evidence supporting vigorous activity, and despite increased awareness of its value, and the implementation of more physical education program time, it is apparent to the researcher and obvious in the review of literature, that a number of children fail to achieve physiological benefit or any desire to engage in physically active recreation because of their minimal involvement in

activity in the physical education environment. Such children characteristically avoid vigorous physical activity where possible, and position themselves in the least active position when it is impossible to avoid activity. Unlike many of their peers, they seldom volunteer for demonstrations and are reluctant to co-operate when chosen to do so. In situations where teams are chosen by peers, these children are usually the last ones chosen. They avoid activity by providing numerous excuses, and procrastinate with such tactics as re-tying shoe laces or replacing hair-bows. Review of literature reveals descriptors of such children as "unenthusiastic" (Wilson, 1979), "sedentary, inactive" (Bailey, 1973), "socially isolated" (Marlowe, 1980) and "awkward" (Wall, 1981). Experience has shown that few of these children simply outgrow these characteristics without special attention, but continue through elementary school receiving little positive reinforcement from physical education. These are the children who become "non-participants" (Magill and Ash, 1979), and "physical education drop-outs" (Hyland and Orlick, 1976).

While being cognizant of the fact that young children should perform at their "own level", it is nonetheless apparent that for many children additional encouragement for vigorously active participation is needed at an early age. Failure to participate actively in physical education activities results in lack of achievement, and

satisfaction causing two separate problems, one that the child is unable to keep up with peers, the other is that peers are unwilling to include poorly skilled players in their activities, hence the child is isolated from physical activity, and possibly from other kinds of activities in which that group might engage. Lack of involvement results in lack of practice, which in turn results in a lower skill level that is seen as an undesirable quality among peers who choose physically active recreational activities.

Ted Wall, University of Alberta summarizes the problem:

For a variety of reasons kids can't keep up with culturally normative expectations and that is where begins a vicious circle of not being able to play with age level peers, therefore they can't practice the skills, therefore the developmental deficiency between them and the norm group for their age becomes a problem. Therefore the "minnows in the net" (a reference to "Athleticism in the Edwardian and Voritorian School" by John Mangin, "the minnows that escape the net of athleticism"), therefore the low activity kids, therefore the awkward kids, therefore the kids who can't do things (1982).

In view of scientific evidence supporting involvement in vigorous physical activity, and in view of educators' concern for the optimal development of each individual child, research in this area seems justified. As a preliminary step to the development of an intervention program for inactive and minimally active children, the primary purpose of this study was the development of an observation instrument to measure the level of physical activity of

Kindergarten children in physical education.

Statement of the Problem

The primary purpose was the development of a technique for assessing the level of activity of Kindergarten children in physical education. Specifically, the focus of the study was the development of an observation instrument for identifying those individuals who exhibit a low level of physical activity.

Existing observation instruments which were designed primarily for research purposes were cumbersome, required extensive observer training, and were unrealistic in terms of time, personnel and equipment.

Therefore this study focused on the development of an observation instrument to measure the level of physical activity of Kindergarten children in physical education. The observation instrument was to be usable by a physical education teacher in a normal class situation, without the assistance of video equipment. In addition, the instrument was to be designed to be self explanatory, requiring little or no observer training, and with a simple recording system.



CHAPTER II  
REVIEW OF LITERATURE

The review of literature dealt with three areas pertinent to this research. The first briefly discussed the characteristics of children to be identified - those who exhibit a minimal level of physical activity in physical education. The second section reviewed some of the observation instruments which have been developed and used in similar research. And finally, literature concerning observation techniques was reviewed.

Characteristics of Children to be Identified

In the experience of the researcher, it was apparent that approximately 10 percent of children in an average physical education class would be classified as inactive or minimally active. Expert opinion differed on the number of children in this category. Kay Chernowski, Principal of Menasa Elementary School, Edmonton, estimated between 10 and 15 percent of children as needing help in being motivated and Wilson (1978) suggesting as many as 50 percent. In her research project in which 250 children aged eight to fourteen years were interviewed, she found that only half were described by their teachers as being "enthusiastic". Those who enjoyed physical activity did so because it was "fun" and they were encouraged to participate

by parents and peers. The "unenthusiastic" group felt unwanted by their peers, were unable to compete against "bigger" and "stronger" classmates. They received little satisfaction from, and little encouragement for participating.

Wall (1981) in discussing "physical awkward" children stated that:

"most children develop competency in movement skills with relative ease; others who become highly proficient do so from greater interest and practice".

Much of Wall's research is directed to those children who fail to develop "adequate proficiency in movement skills".

He further stated:

If physically awkward children can be helped through the crucial school years (by encouraging them to select activities that they enjoy) they may continue participating in physical recreation activities throughout their lives. (Wall 1981)

Pat Doig, (1982) (Principal of St. Paul's Separate School, London, Ontario) in discussing her school's daily, activity-oriented physical education program and it's effect on very overweight children stated:

They will be "doing", (physical activity) whereas maybe if we had another approach they might eliminate themselves from the program for one / reason or another - bring a note from home or whatever. And as it turned out, these kids are participating and enjoying the activity, and don't feel self-conscious or that they are performing to a class standard.

Further descriptions of the children this research attempted to identify include such statements as "the child who makes daisy chains while playing left field" (Van Holst,

1982), and "the child who is verbally abused or physically pushed out of the way". (Wall, 1982) Marlowe (1980) referred to children with evidence of deficiencies in motor abilities, suggesting that they may eventually become "socially isolated" from their peers because they are unable to keep up with their friends in play and game situations. A similar view was expressed by Whiting, Clarke and Morris (1969), who suggested that children were excluded from play activities because of their inability to perform adequately, and that they may withdraw from other group situations as a result of being excluded from play. Such is the beginning of a vicious circle for inactive and minimally active children. This same view is also held by Wall (1981).

Children who do not participate in vigorous physical activity or who participate at a minimal level of activity rarely achieve proficiency in their activities, thus achieving little satisfaction and thereby becoming less interested in participating. In effect, this results in less and less practice for them until they are either too self-conscious to participate or are unwanted by their peers.

#### Selected Observation Instruments

Review of literature revealed a paucity of information relevant to description and analysis of physical education activities, particularly for young children. Few observation instruments exist, and those which do, have had

limited use. Past research on teaching has focused primarily on the teacher, the program, or verbal interaction between students and teachers in a classroom setting, and not a gymnasium setting. Few observational studies have focused on students in physical education. Barrett (1969) developed a system for assessing student and teacher behavior in primary physical education.

One of the earliest observation studies conducted with young children was that done by Mildred Parten (1933). A time sampling method of observation was used to quantitatively measure social participation and leadership in a pre-school group of 34 children. Sixty daily observations of one minute each were made of the children in which their degree of participation was recorded under six categories ranging from "unoccupied" behavior to "organized supplementary play". While the Parten study was not pertinent to this research, the method of "time sampling" was considered to be a useful means for conducting this research.

In a kindergarten study on co-operative behavior, Orlick, McNally and O'Hara (1978) used a cyclical ten second observation technique. Twenty children were observed in the study, and observation continued for approximately thirty minutes. Another observation method used in the same study was group observation utilizing a continuous scan of subjects engaged in free play activity. Two observers were used in this observation, each scanning one

half of the classroom simultaneously.

The time sampling technique used by Orlick et al. (1978) appeared to be a usable technique for use with kindergarten children and in a physical activity setting. Group observation using the continuous scan would in the opinion of the researcher, be impractical in a regular physical education class with one teacher.

Jensen (1979) developed an interaction instrument which combined the work done by Parten (1933) with that of Orlick (1978). In addition to the categories of behavior identified by Parten and Orlick, Jensen added a further category, "Negative Social Interaction". Classroom observers were not used in this study, but three VTR cameras recorded the actions of 13 subjects, aged three, four and five years. The purpose of this study was to determine the effects of participation in co-operative games on the nature of social interaction among kindergarten children in a free play setting. This method of observation was considered by the researcher to be impractical because of the requirements of the three VTR cameras, which are generally unavailable to the average classroom or physical education teacher.

In recent years the term "descriptive-analytic research" has been used to describe "what is happening" in classrooms and learning centres.

Descriptive-analytic research...focuses on the rather modest goal of accurately describing real-world events in the classroom (or gymnasium) and analyzing these events in a way that leads to a better understanding of what transpired.  
(W. Anderson, 1971)

Perhaps the most significant research completed in the area of descriptive-analytic research has been directed by William Anderson (1971) of Teachers' College, Columbia University. Under his supervision, a Data Bank Team of Doctoral students collected a library of video-tapes of physical education classes in New York, New Jersey and Connecticut public schools. In all, eighty-three tapes were collected for use in data analysis of physical education classes. Since then, several of his students have developed systems of observation and analyses of significance.

A doctoral student of Anderson's, Susan Ann Leubach, (1975) developed from this Data Bank, an observation system entitled, BESTPED, an acronym derived from Behavior of Students in Physical Education. Her system included four dimensions: Function, Content, Mode and Time. The first had twelve categories which described what the student was doing - playing, awaiting, etc. Content listed physical education activities which described the student's behavior. Mode consisted of either Movement or non-movement. Time indicated the duration of each functional behavior.

The BESTPED system of observation was designed for

use by trained educators and researchers. Two forms of the system have been thusly developed.

The system itself was a lengthy observation instrument requiring substantial observer training and use of VTR equipment. Live coding would be extremely difficult, if not impossible. Its primary function was to describe student behavior in physical education classes.

In 1977, another student at Columbia Teachers' College, John Anthony Costello utilized the BESTPED system to provide a descriptive analysis of student behavior in elementary physical education. In this study, student behavior was coded for 300 clock hours. Once again, the coding was done from VTR equipment and not in a live class situation, an impractical consideration for most physical education teachers.

The BESTPED system was considered by the researcher to be a very sophisticated system, significant for research purposes but unsuitable for live observation in a regular class situation. The time sampling method used was considered practical and usable. Categories identified in the study were considered impractical in the development of an observation instrument to assess the activity level of Kindergarten children in physical education.

### Observation Techniques

Numerous observation techniques were apparent in the review of literature: time sampling by Parten (1933), cyclical time sampling by Orlick, McNally and O'Hara (1978), scanning by Orlick (1979), and descriptive analytic research used by W. Anderson (1971), Laubach (1974), and Costello (1977).

Regardless of the type of observation technique used, the following criteria should be observed:

Observation as a research technique must always be expert, directed by a specific purpose, systematic, carefully focused and thoroughly recorded. (Best, 1977: 178)

Siedentop (1976) defined a number of observation techniques, all of which have been used extensively, were easy to learn and to use. In addition to "time sampling" and "scanning", he included "event recording" (the number of times a behavior occurred within a given time frame), "duration recording" (how long a behavior continued), "Plachek recording" (Planned Activity Check, scanning periodically for particular behaviors), "permanent<sup>30</sup> products", (the completion of certain criteria), "self-recording" (check in to start, or record the number of practices, etc.) and finally, "multiple observation" methods (a combination of any or all of the above)

"Time sampling", according to Siedentop, (1976) is a useful observation technique, as observation of more



than one subject at a time is possible, and much information can be acquired in a short time.

CHAPTER III  
METHODOLOGY

Development of the Instrument

Following a review of literature concerned with observation instruments and descriptive analytic research, it was apparent to the researcher that few such instruments relating directly to physical education actually exist, and those in existence, designed primarily for research, were cumbersome, required extensive observer training, and made unrealistic demands of time, personnel and equipment.

The researcher was primarily concerned with developing an observation instrument

1. for physical education and measuring the activity level of subjects
2. usable in a normal class situation
3. usable by a physical education teacher
4. efficient in terms of time and equipment
5. specific enough to identify the subjects for which it was intended
6. self-explanatory, requiring little or no observer training
7. simple to record

To meet these requirements, a review of literature was undertaken to familiarize the researcher with existing instruments and the techniques used in the development of such instruments.

The earliest available observation study available was that undertaken by Parten in 1933, who implemented a "time-sampling" technique for observing the social behaviour of pre-school children. The time interval for the Parten study was one sixty second observation on each subject daily. The time sampling technique was considered desirable by the present researcher, but a longitudinal study was not feasible, hence the decision to use the technique of time sampling, but to select a more practical time interval.

The BESTPED system of activity analysis, developed by Laubach (1974) and refined by Costello (1977) utilized a five second time interval observation technique, and a sophisticated coding system to record student behaviour.

From the review of literature it was apparent that a time sampling technique would be most appropriate for the study. The five second interval was adopted because it allowed sufficient time to observe the subject and establish the level of activity being pursued.

The identification of activity levels was the next consideration in the development of the observation instrument. Again, a review of literature revealed categories for observation and systems for rating. Parten

(1933) utilized a total of eleven categories to observe social behaviour. Jensen (1979) utilized ten categories to observe social interactions between kindergarten children in a free play setting. Cote (1980) in a study evaluating physical education programs utilized four categories for rating physical activity level.

- 0 - no activity
- 1 - activity producing a heart rate below 129
- 2 - activity producing a heart rate from 130 - 150
- 3 - activity producing a heart rate over 150

The categories of Cote's study were considered impractical in developing an observation instrument for kindergarten children, but the rating scale 0, 1, 2, 3 was considered efficient, simple and usable in a regular class situation by a physical education teacher. The task then became a redefining of categories utilized by Cote into categories suitable for the present study.

The following categories were established:

- 0 Inactive Absence of activity. Subject is waiting, watching, resting or distracted by unrelated incident
- 1 Minimally Active Subject is minimally involved; picking up, returning or retrieving equipment slowly. Preparing for activity, or indecisive about choice of equipment. Easily distracted

2. Moderately Active Subject is moderately active, using some equipment. Performs consistently. Changes, chooses and returns equipment without undue delay.
3. Vigorously Active Subject participates vigorously and enthusiastically. Changes equipment quickly and purposely. Performs attentively, and is seldom distracted.

#### Development of the Rating Form

The observation instrument required the use of a systematic information recording device for data collection during "real time" and VTR observations. Its specific purpose was to record subject identity and sex, group identity, and systematic observations of the subjects' activity levels as proposed in the rating scale. Simplicity of use was an essential consideration.

A score sheet method was adopted primarily for simplicity and efficiency in recording a large amount of pertinent data, and a score sheet (see Appendix B) was designed for the specific purpose of recording the information sought in the observation aspect of this study.

### Instructions to Observers

To systematically inform the observers of their task, and to ensure uniformity of observation and recording, an information sheet was prepared and presented to each observer prior to the first preliminary observation period. Specifically, the information sheet explained the five second intervals - one to observe, the next to record the observed rating and to locate the next subject; the duration of the observations; and the key for rating the subjects after each observation. Observers were asked to read the instructions (See Appendix A) and thoroughly familiarize themselves with the procedure. Two groups of Kindergarten children provided opportunity for practice and refinements prior to the primary study.

### Subjects

Prior to the study, permission to conduct the study was obtained from the Principal of the school, and cooperation was sought from the physical education teacher and the classroom teachers concerned. At the conclusion of the study, participation badges were presented to the subjects.

Subjects for the study were 39 first year Kindergarten students of Virginia Park Elementary School, St. John's, Newfoundland, of whom 19 were girls and 20 were boys. Subjects were randomly assigned to groups which

ranged in size from four to seven children. They were individually identified by coloured sashes worn throughout the observation period. Identifying colours for subjects were orange, blue, white, green, yellow, brown, and other. Groups were designated by letters, A, B, C etc. and the letter for each group was posted in view of the observers.

#### Location

A portion of the gymnasium was cordoned off using pylons placed approximately one metre apart. The play area measured approximately 10 metres by 15 metres. A diagram of the play area is presented in Figure 1.

#### Equipment

A free play situation was created in the gymnasium, with the following equipment provided.

7 Volleyballs

7 scoops and Coson balls

7 hula hoops

7 skipping ropes

gymnastic mat 1.5 metres by 4 metres

inclined bench

permanent climbing bars were also used

The size of the play area was determined by the viewing range of the VTR equipment. The area was of sufficient size to allow for free play without undue

restrictions or interference by other subjects. Equipment was positioned to allow free movement from one station to another, and to allow for "lining up to take turns". Small equipment was placed in a far corner to prevent obstruction in the playing area. The group sign was placed so as to be visible throughout the viewing time.



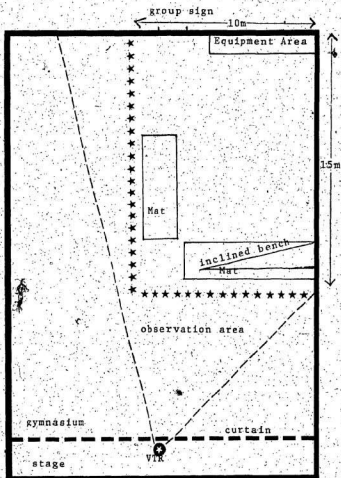


Figure 1. Diagram of gymnasium, observation area, placement of equipment and apparatus

### Technical Equipment

A VTR camera was used throughout the observation periods to record the activities of all subjects simultaneously. The camera was positioned behind closed curtains on the stage of the gymnasium and was not visible to any of the subjects. The camera technician remained behind the curtain at all times.

A cassette recorder was used to signal a pre-recorded bell sound repeated every five seconds for the duration of the observation period. The bell sound was audible to the observers and was recorded on the audio track of the VTR recorder.

### Time and Duration

Filming and observations were conducted simultaneously in one day. Groups were observed for approximately twenty minutes, or until all subjects within the group had been observed for twelve five second intervals.

### Procedure

Subjects were randomly assigned to small groups by the classroom teacher and proceeded to the gymnasium in these groups. Upon entering the play area, they were equipped with identifying coloured sashes, visible from all directions. Before commencing activity, they were asked to select a happy/non-expressive/sad face (Figure 2) to best

describe their feelings about physical education. Responses were recorded by one of the three observers.

At the starting signal, subjects were free to engage in any of the provided activities. Observers began recording observations at the start of the bell. One observer verbally directed the others to the specific subject and indicated the exact interval for rating. This was found to be necessary to avoid the confusion of precisely which five second interval to observe or record.

Each subject was observed for a five second interval, and in the following five second interval observers recorded their ratings and located the next subject. When all subjects had been rated once, observers were directed back to the first subject to begin the second rating for each. When all subjects had been observed for twelve five second intervals activity stopped and subjects returned to their classroom to be followed by a new group. A total of seven groups was observed. The first two represented trial groups, and the study focused on the remaining five groups.

#### Happy Face Questionnaire

Subjects were individually asked to respond to the question, "How do you feel when it's time to come to the gym for physical education?" by pointing to the appropriate "Happy Face" in a series of three. The faces were drawn on

a single sheet of paper and held by one of the observers. The question was posed to the subjects to ascertain whether or not attitudes toward physical education were reflected in the scores obtained during observation of activity levels.



Figure 2. "Happy Face" rating scale

## CHAPTER IV

## RESULTS

Each child was observed for twelve five second intervals, and his/her activity ratings were recorded. The sum of these activity ratings was the subject's score.

Table 1 shows cumulative scores for each subject recorded by each of two observers.

Table 1. Cumulative Score  
For Each Subject by Two Independent Observers.

Subject	Observer 1	Observer 2	Total	Individual Mean
C orange	23	17	40	20
C blue	21	21.5	42.5	21.2
C white	21	24	45	22.5
C yellow	33	28	61	30.5
C green	27	22	49	24.5
D orange	22	17	39	19.5
D blue	20	19	39	19.5
D white	25	23	48	24
D yellow	18	16	34	17
D green	19	19	38	19
D brown	26	25	51	25.5

Table 1. Continued

Subject	Observer 1	Observer 2	Total	Individual Mean
E orange	28	26	54	27
E blue	20	20	40	20
E white	23	22	45	22.5
E yellow	10	12	22	11
E green	28	26	54	27
E brown	19	18	37	18.5
F orange	18	17	35	17.5
F blue	14	11	25	12.5
F white	19	19	38	19
F yellow	22	22	44	22
F green	23	24	47	23.5
F brown	20	19	39	19.5
G orange	27	25	52	26
G blue	26	27	53	26.5
G white	15	16	31	15.5
G yellow	16	13	29	14.5
G green	21	21	42	21
G brown	24	21	45	22.5
G purple	18	19	37	18.5
GROUP MEAN	21.5	20.3	41.85	

For raw scores see Appendix C. The sixty individual scores (that is, thirty subjects scored by each of two observers) are shown in Figure 2. Table 2 presents the mean and standard deviation of scores by groups.

Table 2. Mean and Standard Deviation for each Group

Group	Mean	Standard Deviation
C	23.75	4.52
D	20.75	3.36
E	21.00	5.80
F	19.00	3.74
G	20.64	4.67
All groups combined	21.03	4.42

Frequency distribution of scores is presented in Figure 3.

XXXXXXXXXXXXXXXXXXXX

⊕ Observer 1  
○ Observer 2



Figure 3. Histogram of frequency distribution of sixty observations



Three characteristics of measuring instruments which must be considered are validity, objectivity and reliability. These three characteristics were determined by correlating techniques using Pearson Product Moment throughout.

#### Validity

The validity of this observation instrument was calculated by determining the coefficient of correlation between observations made in "real time" and those made from the videotape. The recorded tape was viewed carefully. Each subject was viewed and rated on every five second interval throughout the entire activity period. The scores of those intervals designated by the audible "caller" (which were the intervals rated in "real time") were used as a criterion against which scores for "real time" observations were compared.

Validity coefficients for each group and for all groups combined are presented in Table 3.

Table 3. Validity coefficients.

Groups	Observer 1 and VTR	Observer 2 and VTR
C	.88	.93
D	.84	.80
E	.96	.97

Table 3. Continued. Validity coefficients.

Groups	Observer 1 and VTR	Observer 2 and VTR
F	.97	.87
G	.82	.77
All groups combined	.89	.87

The Validity coefficient for the observation instrument, combining all groups was .88

#### Objectivity

A test of objectivity was administered to the results of observations performed in this study. The scores recorded for each subject by two independent expert observers were correlated. Table 4 shows correlation for each group and for all groups combined.

Table 4. Objectivity coefficient

Group	Observers 1 and 2
C	.65
D	.87
E	.99
F	.99

Table 4. Continued Objectivity coefficient

Group	Observers 1 and 2
G	.92
All groups combined	.89

Objectivity coefficient for the observation instrument, combining all groups was .89.

#### Reliability

The reliability of this observation instrument was determined by calculating the coefficient of correlation between two separate observations of the videotape made three weeks apart. For each observation the tape was run at normal speed and was run without interruption to simulate "real time" observation. For each subject the same 12-five second intervals were observed and rated. The results of these correlations are presented in Table 5.

Table 5. Reliability coefficients

Group	Reliability Coefficient
C	.93
D	.75
E	.93
F	.78
G	.91
All groups combined	.87

For the five groups combined, the reliability coefficient of the observation instrument was .87.

#### "Happy Face Questionnaire"

Of thirty subjects questioned "How do you feel when it's time to go to the gym for physical education?", all responded by pointing to the first face, the one designating a happy feeling. (See Figure 2)

#### Male-Female Differences

Differences in activity scores achieved by males and females were investigated. Results for activity observations of female subjects are presented in Table 6.

Table 6. Cumulative scores  
of fourteen female subjects by two independent  
observers.

Subject	Observer 1	Observer 2	Total	Indiv. Mean
C white	21	24	45	22.5
C yellow	33	28	61	30.5
D white	25	23	48	24
D green	19	19	38	19
E white	23	22	45	22.5
E yellow	10	12	22	11
E brown	19	18	37	18.5
F orange	18	17	35	17.5
F white	19	19	38	19
F yellow	22	22	44	22
F green	23	24	45	22.5
G orange	27	25	52	26
G white	15	16	31	15.5
G purple	18	19	37	18.5
GROUP $\bar{M}$	20.86	20.57	41.29	
S.D.			9.50	

$t = .2817$

28 df

Results for activity observations of male subjects and presented in Table 7.

Table 7. Cumulative results  
of sixteen male subjects by two independent  
observers.

Subject	Observer 1	Observer 2	Total	Indiv. Mean
C orange	23	17	40	20
C blue	21	21.5	42.5	21.2
C green	27	22	49	24.5
D orange	22	17	39	19.5
D blue	20	19	39	19.5
D yellow	18	16	34	17
D brown	26	25	51	25.5
E orange	28	26	54	27
E blue	20	20	40	20
E green	28	26	54	27
F blue	14	11	25	12.5
F brown	20	19	39	19.5
G blue	26	27	53	25.5
G yellow	16	13	29	14.5
G green	21	21	42	21
G brown	24	21	45	22.5
GROUP M	24.9	20.09	42.22	
S.D.			8.58	

A t-test was performed to determine the significance of the observed differences between the male and female subjects. Results are presented in Table 8.

Table 8. Observed differences in Male and Female Subjects

Subjects	M	S.D.	df	t
Male	42.22	8.58		0.280
			28	0.28
Female	41.29	9.50		

2.048 required for significance at the 0.05 level

CHAPTER V  
DISCUSSION

The purpose of this study was to develop an observation instrument to measure physical activity of Kindergarten children. The intended purpose of the instrument was to identify those children who exhibit a level of physical activity insufficient for physiological benefit.

The first part of the study dealt with the development of the instrument and the second part with testing its validity, objectivity, and reliability.

A time sampling method of observation was used to observe a total of thirty-nine subjects, of whom nine were included in the preliminary observations staged primarily as a training session for the observers and as a trial run to identify refinements for the instrument. Two such training sessions were provided with groups A and B. Ratings from these observations were not included in the results of the primary study with groups C to G.

Refinements to the Instrument

The five second interval was established as an interval of sufficient length to identify a "level of activity" for the observed subject. For the first group observation, an attempt was made to record five one second activity levels within the five second interval. However,



this method was discarded in favour of a single notation indicating the "average" level of activity within the five second interval. This change was implemented in view of the difficulty of observing a subject and recording each second of activity within the interval.

A second refinement was made to the observation procedure in that during the training session there appeared to be some discrepancy concerning which five second interval was being used for observation. This caused discrepancies in recording scores. In addition to the five second bell sounds recorded for the identification of intervals, it was decided to add "colour cues" from a "caller". This was a verbal means of identifying the precise interval for observation, and for identifying, without error, the next subject. The "caller" was used throughout the entire observation period for each group. The "colour cues" were recorded on the audio track of the VTR.

Some confusion existed in two areas of the rating scale. The first area of disagreement was "changing activities" which was not specifically indicated on the scale. However, since this particular study was conducted in a free play situation, it was agreed that rating of this activity would be judged on the basis of its intensity, rather than being arbitrarily scored 1 - minimally active

(preparing for activity)\*. In viewing the subjects it was obvious that some changed activities very vigorously while others did so very slowly and with minimal activity.

The second area of disagreement was obvious in observing partner activities, where one partner was required to wait for action from the other, as in throwing and catching a ball. In this situation it was agreed to judge the activity level on the basis of whether the subject was being as active as the task allowed. Again, some subjects were very attentive to their task, and retrieved quickly without undue delay. Others, while waiting for partner response, were inattentive and easily distracted from the required task.

The "Instructions to Observers" was concise and easily understood by all observers. No changes or recommendations for same were made. The rating scale was simple to use and efficient to record. Categories were well defined and following the previously reported refinements presented no difficulty to the observers. The score sheet was useful in collecting all information required in recording identities of groups and individuals' ratings and

\* See page        where "preparing for activity" is defined.

scores. A "total score" column would have been desirable.

Validity, Objectivity and Reliability

Validity coefficients ranged from .80 to .97 for each group observation correlation, with an overall validity coefficient of .88. According to Clarke (1979: 24) "The most desirable standards are 0.90 and above, although correlations above 0.80 are considered "significant"."

Objectivity coefficients ranged from .65 to .99 for each group observation, with an overall objectivity coefficient of .89. The following objectivity coefficients are identified by Clarke (1976: 27).

- 0.95 - 0.99 very high; found among the best tests
- 0.90 - 0.94 high; acceptable
- 0.80 - 0.89 fairly adequate for individual measurement

Reliability coefficients ranged from .75 to .93 for each group overall reliability coefficient for the observation instrument was .87.

Noll (1965) states that

Desirable reliabilities differ according to purpose. When a test is intended only for use in studying groups, a lower reliability coefficient (around .75) may be sufficient to make fairly accurate comparisons. When individual differentiation is the goal, reliabilities of .95 or higher are very desirable.

The obtained validity (.88), objectivity (.89) and reliability (.87) coefficients of the observation instrument in this study were of desirable level and

reflective of what might realistically be achieved in a normal class situation by a physical education teacher and without the use of VTR equipment and trained observers.

These results compared favourably with some of the more sophisticated studies of behaviour observation. Laubach (1974) achieved inter and intra judge agreements of 91.5% and 92%, while Hurwitz achieved results of 91.1% and 92%. Similar results were achieved by Fishman (1974)- 90.74% and 91.98%, and Anderson (1974) whose overall inter-judge agreements ranged from 72.3% to 96.6%. Observer accuracy for Jensen's (1979) study ranged from 83.3% to 100%, with an overall agreement of 96.5% (p.187) while Orlick et al. (1978) achieved an average reliability of 97% agreement, and inter observer agreement ranged from 92% to 100%.

#### Happy Face Questionnaire

Subjects' universal response in the Happy Face Questionnaire indicated a very positive attitude toward physical education, but no relationship to activity level. Obviously, response to the question, "How do you feel when it's time to go to the gym for physical education?", was not an indicator of observed activity levels of Kindergarten children.

Male - Female Differences

Comparison of the differences in scores obtained by male and female subjects was investigated. The significance of the difference between the two means was computed using a t-test and there was found to be no significant difference in activity level between male and female subjects at the Kindergarten level.

CHAPTER VI  
SUMMARY AND CONCLUSIONS

The researcher was primarily concerned with developing an observation instrument for measuring activity level of Kindergarten subjects in physical education. It was also required to be usable by a physical education teacher in a normal class situation, and requiring a minimum of observer training. Simplicity of recording was also a consideration. The instrument was developed and tested in this study and was found to meet the criteria of simplicity and ease of use, while maintaining a desirable level of validity, objectivity and reliability.

No attempt was made to identify children in need of remediation through the obtained scores. The range from 10 to 33, mean 21.03, and standard deviation 4.42 would indicate that scores in the range of 0 to 14 if obtained repeatedly might give cause for concern.

Recommendations for further study

It is recommended that the observation instrument developed and tested in this study be used to test more subjects. In view of the small number observed in this study, further studies of this nature should be undertaken.

It is suggested that this instrument be used in a longitudinal study to assess the activity level of the same

children at different intervals throughout the school year. Judgements based on a single observation would be questionable. A further recommendation to this project would be to observe the same children at different grade levels throughout elementary school, and by comparison of results determine the point at which positive identification of activity level can be established.

A further recommendation is that the instrument be used to identify inactive or minimally active children. Positive identification could result in assessment of subject readiness for a particular activity, remediation priorities, evaluation of program and of teaching styles.

The observation instrument could be used to determine the activity level of the program, as well as that of the subjects observed. At different grade levels, the same technique might be used to determine the ratio of activity to rest in a game or practice situation.

Use of this instrument would be a useful means of providing valuable information to physical education teachers and researchers concerned with the implications of activity levels of children in physical education.

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APPENDIX A  
INSTRUCTIONS FOR OBSERVERS

**Instructions for observers:**

Each subject will be observed individually for 5 seconds. A "free" 5 second interval will follow each observation to allow completion of scoring for that interval and for locating the following subject.

**Key for rating:**

- 0 - Absence of physical activity. Subject is waiting, watching, resting or distracted by unrelated incident.
- 1 - Subject is minimally involved; picking up, returning or retrieving equipment slowly. Preparing for activity, or indecisive about choice of equipment. Easily distracted.
- 2 - Subject is moderately active, using some equipment. Performs consistently. Changes, chooses and retrieves equipment without undue distraction.
- 3 - Subject participates vigorously and enthusiastically. Changes equipment quickly and purposely. Performs attentively, and is seldom distracted.

**General instructions:**

1. Locate subject
2. Locate score block

3. Observe for 5 seconds, recording five 1 second observations, one per second
4. If activity remains constant throughout the five second observation period, your recording for block (1) should read, 33333 or 11111, etc.
5. If activity level changes during the 5 second observation period, your recording for block (1) should read 33210 or 22233, etc.
6. Locate next subject and score block, and continue as before. When all subjects have been rated once, return to first subject for second rating.
7. Observations will continue for a total of 10 minutes per class, thus allowing twelve 5 second observations per child.
8. Each 5 second interval will be indicated by a recorded bell sound.

APPENDIX B  
SCORE SHEET





APPENDIX C  
RAW SCORES - OBSERVER 1

Score Sheet

GROUP (Circle One) A B C D E F G H I

Observation Period 1 2 3 4 5 6 7 8 9 10 11 12

Orange M F 23 1 2 2 2 2 3 3 2 2 0 2 2

Blue M F 21 2 2 1 2 3 1 0 -2 1 2 2 3

White M F 21 1 2 0 2 2 2 2 2 2 2 -3 1

Yellow M F 33 2 3 2 3 2 3 3 3 3 3 3 3

Green M F 27 1 3 3 3 1 2 2 2 2 5 2 3

Brown M F

Other M F

## Score Sheet

GROUP (Circle One) A B C D E F G H I

Observation Period	1	2	3	4	5	6	7	8	9	10	11	12
<u>M</u> <u>F</u> 22	1	3	1	0	3	1	2	3	1	2	3	2
Blue <u>M</u> <u>F</u> 20	1	3	2	1	0	1	3	2	1	2	1	3
White <u>M</u> <u>F</u> 25	2	2	3	1	1	2	3	3	2	3	3	0
Yellow <u>M</u> <u>F</u> 18	2	1	1	1	0	0	0	3	2	2	3	3
Green <u>M</u> <u>F</u> 19	2	1	0	2	2	0	2	2	3	1	2	2
Brown <u>M</u> <u>F</u> 26	2	1	2	2	2	3	3	3	3	2	0	3
Other <u>M</u> <u>F</u>												





## Score Sheet

GROUP (Circle One) A B C D E F G H I

Observation period	1	2	3	4	5	6	7	8	9	10	11	12
Orange M <u>F</u>	3	2	2	2	2	3	0	3	3	3	1	3
Blue M <u>F</u>	3	2	2	3	2	1	3	2	2	1	2	3
White M <u>F</u>	15	1	1	2	1	1	0	1	2	2	3	0
Yellow M <u>F</u>	16	1	1	1	2	2	2	2	1	2	0	1
Green M <u>F</u>	21	2	1	2	3	2	0	3	1	1	2	1
Brown M <u>F</u>	24	2	0	0	2	3	3	2	2	1	3	3
Other M <u>F</u>	18	1	1	2	2	0	1	2	3	2	1	1

APPENDIX D  
RAW SCORES - OBSERVER 2









Score Sheet

GROUP (Circle One) A B C D E F G H I

Observation 1 2 3 4 5 6 7 8 9 10 11 12

Orange M F 17 2 2 2 3 0 0 0 0 1 2 2 3

Blue M F 11 1 1 1 0 0 1 1 1 1 2 1 1

White M F 19 1 2 1 1 2 2 1 0 3 2 2 2

Yellow M F 22 2 3 1 2 1 0 1 2 1 3 3 3

Green M F 24 1 1 2 2 3 1 2 2 2 3 3 2

Brown M F 19 3 3 2 2 0 0 0 0 2 2 3 2

Other M F

Score Sheet

GROUP (Circle One)	A B C D E F <u>G</u> H I											
	1	2	3	4	5	6	7	8	9	10	11	12
Orange M P 25	2	2	2	2	2	3	0	3	2	3	1	3
Blue M P 27	3	2	3	3	2	2	2	2	2	1	2	3
White M P 16	0	2	2	2	2	0	0	2	2	3	1	1
Yellow M P 13	0	1	1	2	1	2	2	1	1	0	1	1
Green M P 21	2	1	2	3	2	0	3	2	1	1	1	3
Brown M P 21	1	0	0	2	3	2	1	2	1	3	3	3
Other M P 19	1	1	2	1	0	1	3	3	2	2	1	2

APPENDIX E  
RAW SCORES - 1st. VTR VIEWING











Score Sheet  
1st. VTR VIEWING

GROUP (Circle One) A B C D E F G H I

Observation period	1	2	3	4	5	6	7	8	9	10	11	12
Orange M <u>P</u> 26	3	2	2	2	1	3	0	3	3	3	1	3
Blue M <u>P</u> 21	2	1	2	3	2	1	3	1	1	1	1	3
White M <u>P</u> 18	0	2	2	2	1	1	1	2	2	3	1	1
Yellow M <u>P</u> 15	1	1	1	2	2	2	2	1	1	0	1	1
Green M <u>P</u> 17	1	1	1	3	1	0	3	1	1	1	1	3
Brown M <u>P</u> 21	1	0	0	2	3	3	1	1	1	3	3	3
Other, M <u>P</u> 19	1	1	2	1	1	1	3	3	2	1	1	2

APPENDIX F

RAW SCORES - 2nd. VTR VIEWING

## Score Sheet

## 2nd. VTR VIEWING

GROUP (Circle One) A B C D E F G H I

Observation period 1 2 3 4 5 6 7 8 9 10 11 12

Orange

M F 21 1 1 2 3 2 3 0 3 2 2 0 2 2

Blue

M F 22 2 1 2 2 3 1 0 3 1 2 2 3

White

M F 28 1 3 1 3 3 3 3 3 2 2 3 1

Yellow

M F 33 2 3 3 3 3 3 3 2 2 2 3 3

Green

M F 29 2 3 3 3 2 2 3 2 3 1 2 3

Brown

M F

Other

M F







## Score Sheet

## 2nd. VTR VIEWING

GROUP (Circle One) A B C D E F G H I

Observation period 1 2 3 4 5 6 7 8 9 10 11 12

Orange

M F 28 3 2 2 2 2 3 2 3 2 3 1 3 1

Blue

M F 22 2 2 2 3 2 0 2 2 1 1 2 3

White

M F 21 1 2 2 2 1 2 3 2 2 3 0 1

Yellow

M F 14 0 1 1 2 2 2 2 1 1 0 1 1

Green

M F 20 2 1 2 3 1 2 2 1 2 1 1 2

Brown

M F 22 1 0 0 2 3 2 1 2 2 3 3 3

Other

M F 17 1 1 1 2 1 1 1 2 3 2 1 1



