THE EFFECT OF TWO INSTRUCTIONAL APPROACHES ON THE OBJECT
CONTROL SKILLS OF CHILDREN CONSIDERED DISAVANTAGED

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
The Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Harriet Naki Amui, BEd. M. S.

The Ohio State University

2006

Dissertation Committee: 

Approved by

Dr. Jacqueline Goodway-Shiebler, Co-Advisor 

Dr. Samuel R. Hodge, Co-Advisor 

Dr. Antoinette Miranda 

Advisors 

College of Education
ABSTRACT

The purpose of this study was to examine the influence of a nine-week direct instruction program and a nine-week mastery motivational climate program on the object control (OC) skills of children considered disadvantaged. Seventy-seven participants were randomly selected from Head Start classes. A Pretest-Posttest Randomized Groups design was used (Thomas & Nelson, 1996). Participants were randomly assigned to one of three groups. There were two intervention groups and a Comparison Group. Intervention Group 1 (n = 27) received direct instruction. Intervention Group 2 (n = 24) received mastery motivational climate. The Comparison Group (n = 26) received no intervention. Both Intervention Groups participated in a nine-week OC skill intervention program with a total 18, 30-minute sessions. Participants were tested before and after the intervention using the Test of Gross Motor Development-2 (Ulrich, 2000). On pre-intervention measures, Intervention Group 1 (34.52%), Intervention Group 2 (36.42%), and the Comparison Group (31.62%) demonstrated average OC skills. There was not a significant Group effect indicating no differences in the OC skills between the groups at pre-intervention (\(F, [2, 71] = 46, p = .63\)). However, there was a significant main Gender effect for OC skills (\(F, [1, 71] = 13.18, p < .001\)) with boys scoring higher than girls.
A 3 Group X 2 Time X 2 Gender ANOVA with repeated measures revealed a significant Group X Time interaction \( (F[2, 71] = 69.92, p < .0001, \eta^2=.66) \). Post-hoc Tukey HSD tests revealed that Intervention Group 1 \( (p < .0001) \) and Intervention Group 2 \( (p < .0001) \) were significantly better than the Comparison Group from pre to post-intervention. There were no significant differences between Intervention Group 1 and Group 2 \( (p = .99) \). There was a significant Time effect \( (F[1, 71] = 323.45, p < .0001, \eta^2=.820) \). Overall, groups improved from pre-to post-intervention. Follow up paired sample \( t \)-tests revealed that both Intervention Group 1 \( (t[26] = -13.76, p < .001 \text{ [2-tailed]}) \) and Intervention Group 2 \( (t[23] = -13.41, p < .001 \text{ [2-tailed]}) \) significantly improved from pre to-post intervention. In contrast, the Comparison Group did not improve from pre-to post-intervention \( (t[25] =-1.40, p = .173 \text{ [2-tailed]}) \). The results indicated that there was not a significant Time X Gender interaction effect \( (F[1, 71] =1.701, p = .196, \eta^2=.023) \). These results suggest that gender differences were present in pre to post-intervention OC scores. These findings suggest that both direct instruction and mastery motivational climate can significantly improve the OC skills performance of young children. The findings from this study have practical relevance to early childhood teachers and physical educators.
Dedicated to my parents
Seth and Lily Nyavor
ACKNOWLEDGMENT

Indeed, a life worth struggling is worth living ultimately amidst laughing, joy and happiness. At this point in my life I would not like to recount the untold hardships, suffering from extreme pain so excruciating that death was just the alternative. But clinging and hanging on to life is something special that comes out of love and encouragement from friends and well-wishers.

Today if that ordeal is ended and this dissertation is accomplished, I am full of ecstatic delight to pour my heart out and express my deepest gratitude to all those who stood by me when I was in agony, but for those individuals I would not have lived to this day. Among such individuals were Dr. Jackie Goodway-Shiebler, Dr Sandy Stroot, and Dr. Mary O’Sullivan who took time off their heavy schedules to be with me through it all, I am highly indebted to you. My colleagues Dena, Myung, Carla, Tristan, Bomna, Sunghan, Takahiro, Quimi, Beth, Amaury, and Carlos, thank you for your visits and encouragement to get out of my sick-bed to be back with you. Your words strengthened my spirits to hang on to complete this work.

I valued your scholarship as my adviser for the four gruesome and agonizing years. Dr. Stroot, Thank you for your time and support.
My current advisers, Dr Goodway-Shiebler and Dr. Sam Hodge, your readiness and support have been indescribable. When I was broken-hearted, dispirited, and at the point of quitting the course, you jointly encouraged and accepted to be co-advisors to see me through. I cannot find words to show my appreciation other than THANK YOU. You will always have a special place in my heart. And to you Dr. Miranda, your acceptance to be a committee member to see me complete the course is much appreciated. Dr. Philip Ward thanks for providing me with all the support throughout the program. My profound gratitude goes to you all for making this possible.

I wish to thank Bob, Yin-Chui, Leah, and Carlos for the tremendous help during the data collection. I could not have done this without you. And to all others who helped in the data collection process I say thanks to all.

I would like to thank my parents and sisters for their support and encouragement during my sicknesses to hold on and fight until the race was won. To my dear son Derrick thanks for your support and encouragement: “Mama, have you finished with your work, can we go to the computer lab….? Your words energized and spurred me on in times of despair.

Finally, to my good friend Patrick, you are the reason why I stayed on to finish. Thank you for the emotional, financial, and spiritual supports. “Kwame Medaase”.

vi
VITA

June 13, 1960……………………………Born, Akuse, Ghana

1988………………………………………..Diploma in Physical Education  
Specialist Training College, Winneba-Ghana

1994……………………………………….. E Ed (Physical Education & Home Economics)  
University of Winneba-Ghana

1997-1999……………………………..Teaching Assistant, Dept. of  
HPERS University of Winneba-Ghana

1999………………………………………..Graduate Teaching Assistant, Dept. of  
HPER, SUNY, Brockport. NY

2000………………………………………..M.S. SUNY College at Brockport NY

2000-2004……………………………..Graduate Teaching Associate, Physical  
Activity and Educational Services  
The Ohio State University

2005………………………………………..Adjunct Lecturer, Dept. of  
HPER, SUNY Brockport. NY

2006………………………………………..Lecturer, Sport & Exercise Education  
The Ohio State University

FIELD OF STUDY

Major Field: Education

Minor Fields: Early Childhood Education and Lifespan Motor Development
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Abstract</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedication</td>
<td>iv</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>v</td>
</tr>
<tr>
<td>Vita</td>
<td>vii</td>
</tr>
<tr>
<td>Abstract</td>
<td>xi</td>
</tr>
</tbody>
</table>

### Chapters:

1. **Introduction**
   - Children Considered Disadvantaged                                    7
   - Motor Skill Intervention                                               10
   - Need for the Study                                                     10
   - Purpose of the Study                                                   11
   - Research Questions                                                     11
   - Limitations of the Study                                               12
   - Delimitations of the Study                                             13
   - Definition of Terms                                                     13

2. **Literature Review**
   - Dynamical Systems Theory                                              17
   - Constrains Model                                                       19
   - Fundamental Motor Skills                                               20
   - Measurement of Fundamental Motor Skills                                22
   - Gender differences in Fundamental Motor Skills                         25
   - Children Considered Disadvantaged                                      27
   - Motor skill Intervention                                               30
   - Mastery Motivational Climate                                           33
   - Classroom Structure and Motivational Climate                           35
   - Effective Intervention                                                 39
   - Summary                                                                42
# Table of Contents

3 Methodology .......................................................................................... 44
   Theoretical Framework ........................................................................ 44
   Research Design .................................................................................. 46
   Context of the Study ........................................................................... 47
   Selection of Participants ..................................................................... 48
   Instrumentation .................................................................................. 50
   Development and Implementation of the Interventions ...................... 54
   Procedures .......................................................................................... 61
   Intervention Integrity .......................................................................... 62
   Rationale for Selection of Statistical Procedures ............................... 65
   Data Analysis ...................................................................................... 67

4 Results .................................................................................................... 68
   Pretest Group Research Questions ..................................................... 68
   Pretest Gender Research Questions .................................................... 70
   Influence of interventions on OC skill Performance by Group .......... 71

5. Discussions/Implications/Recommendations ....................................... 75
   The OC skills Performance of Young Children who are
   Disadvantaged ................................................................................... 75
   Implication of OC Skills Performance of Young Children
   Who are Considered Disadvantaged ................................................ 78
   Gender Differences in OC Skills ....................................................... 79
   Implications of Gender Differences in OC Skills ............................... 80
   Influence of FMS on the OC Skills of Young Children ...................... 84
   Implications of Motor skill Intervention with Young
   Children who are Disadvantaged ...................................................... 91
   Summary and Conclusions ............................................................... 92
   Summary of Findings ......................................................................... 94
   Summary of Implications ................................................................. 95
   Summary of Recommendations ....................................................... 96

List of References .................................................................................... 98
Appendices ............................................................................................ 106
<table>
<thead>
<tr>
<th></th>
<th>Section Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Human Subjects Institutional Review Board Approval</td>
<td>106</td>
</tr>
<tr>
<td>B</td>
<td>Test of Gross Motor Development-2</td>
<td>108</td>
</tr>
<tr>
<td>C</td>
<td>Sample Lesson Plan</td>
<td>113</td>
</tr>
<tr>
<td>D</td>
<td>Instructional Task Analysis of Object Control skills</td>
<td>117</td>
</tr>
<tr>
<td>E</td>
<td>Instructional Task Analysis and Cues Sheet</td>
<td>125</td>
</tr>
<tr>
<td>F</td>
<td>Intervention Integrity Worksheet</td>
<td>127</td>
</tr>
<tr>
<td>G</td>
<td>Facilitators’ Training Protocol</td>
<td>129</td>
</tr>
<tr>
<td>H</td>
<td>Opportunity to Respond Instrument</td>
<td>131</td>
</tr>
<tr>
<td>I</td>
<td>Teacher Feedback Instrument</td>
<td>133</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Indicators of Child Well-being in the State of Ohio in Comparison to the US</td>
<td>6</td>
</tr>
<tr>
<td>1.2</td>
<td>Neighborhood Characteristics of Child Well-being in the State of Ohio in</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Comparison to the US</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Description of TARGET Areas and Motivational Strategies</td>
<td>36</td>
</tr>
<tr>
<td>3.1</td>
<td>Summary of Participants’ Random Assignment to Intervention Groups</td>
<td>50</td>
</tr>
<tr>
<td>3.2</td>
<td>Allotment of Instruction Time for OCS in Direct Instruction</td>
<td>57</td>
</tr>
<tr>
<td>3.3</td>
<td>TARGET as used for Intervention</td>
<td>60</td>
</tr>
<tr>
<td>3.4</td>
<td>Data Analysis Chart</td>
<td>68</td>
</tr>
<tr>
<td>4.1</td>
<td>Pre and Post Raw Scores and Percentiles of Intervention Group 1 and 2 and</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>the Comparison Group</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

Early childhood (after 2 years) is a critical period relative to the development of fundamental motor skills (FMS) in the life of the growing child. During this period, children are ready to begin learning basic motor skills and movement concepts (Gabbard, 2000; Gallahue, 1987). By acquiring basic movement patterns, the child’s potential for learning more advanced skills increases (Seefeldt & Haubenstricker, 1982). In other words, the FMS learned at that early age become building blocks for the child to take part in movement patterns, games, and sports skills (Clark, 1994; Gabbard, 2000; NASPE, 2002; Payne & Isaacs, 2002; Seefeldt, 1982).

Learning FMS can have a positive effect on the physical as well as the social development of the child (Gallahue, 1987). Fundamental motor skill achievement is critical to the overall development of children (Gallahue, 1987; Kogan, 1982; Seefeldt, 1980), and behavior patterns established during early childhood influence future FMS performance of children (Gabbard, 2000; Gallahue, 1987; Kogan, 1982).

Magill (2005) defined motor skills as an act or a task that has a goal and requires voluntary body or limb movement to be properly performed. In differentiating FMS from
movement concepts, Ignico (1994) referred to motor skills as “action verbs”. This implies that motor skills involve movements. There are many approaches to the classification of motor skills. Magill (2005) identified three approaches to defining motor skills based on motor learning and the specific aspect of a particular skill. These were: (a) the precision of the movement, (b) defining the beginning and end points of the movement, and (c) the stability of the environment. In motor development, FMS are commonly classified into three categories: locomotor, object control, and non-locomotor (Gallahue, 1987). Examples of locomotor skills are walking, running, jumping, galloping, sliding, hopping, leaping, and skipping. Examples of object control skills are dribbling, throwing, catching, kicking, striking, and rolling. Finally, examples of non-locomotor skills are bending, twisting, turning in place, moving towards and away from the center of the body, and other body movements performed in place. These movements enable children to control their bodies and manipulate objects within the environment to form complex movements involved in dance, sports, and other motor skill activities (Seefeldt, 1982).

Teachers can have an increasingly important effect on children’s motor skills during the early school years (Rink, 2002). At minimum, they should provide instruction, motivation, and encouragement, for children’s movement behaviors and practice opportunities (Rink, 2002). Standard 1 of the seven National Association for Sport and Physical Education (NASPE) standards for physical education advocates for movement competence and proficiency (NASPE, 1995).

The intent of NASPE Standard 1 is to help children develop sufficient movement competence so that they may enjoy participation in physical activities. For example, a
child who has not acquired much competence in catching would not want to join peers in a throwing and catching game such as basketball because catching and maintaining procession of the ball is very essential in the game. This standard also aims to establish a solid foundation for enhancement of FMS acquisition and increased ability to engage in and apply appropriate motor patterns.

Children learn basic movement skills such as running, jumping, throwing, and catching when they gain control of developmental direction. Children first learn to control movement from head to tail, that is cephalocaudal, and then proximo-distal which is movement away from center of body (Payne & Isaacs, 2004). However proficiency in FMS does not just occur naturally. Fundamental motor skills are influenced by environmental and genetic factors (Gabbard, 1992; Gallahue, 1987; Newell, 1984).

The primary theory of motor skill acquisition, the Dynamical Systems Theory (DST), considers the interaction of contextual and dynamical variables that influence motor development (Thelen & Ulrich, 1991). Movement by this theory is seen as a product of many cooperating subsystems that interact with the organism, environment, and the task to produce movement (Thelen & Ulrich, 1991). Newell (1984) identified the organism, task, and environment as factors that constrain or influence performance of FMS. Organismic constraints include subsystems such as age, gender, weight, height, and motivation.

Task constraints reflect the specific nature of the task and demands of the defined movement patterns. For example, a child could be asked to throw a tennis ball as hard as
possible against a wall over a distance of 20 feet. The environmental subsystem has to do with equipment, nature of facilities, and the instructors involved.

The performance of FMS is perceived to be the resulting interaction among these three factors at any point in time (Thelen & Ulrich, 1991). Given this approach there is expected to be inter- and intra-individual variation (Newell, 1984; Thelen & Ulrich, 1991). Children are ready to begin to learn FMS during early childhood (Gallahue, 1987). During the child’s growth and development, certain times identified as optimal periods occur, and during these periods rapid development and organization takes place in the brain and the nervous system (Thomas, Lee, & Thomas, 1988). Thomas et al. (1988) explained that, tasks and skills acquired during these times are learned faster and with less effort on the part of the child and the teacher. The term readiness is used to describe the beginning of the optimal period, and by this time the child has developed all the prerequisite skills required and is motivated to learn new tasks or skills (Thomas et al. 1988).

Significant age and gender differences have been found to be associated with many motor tests (Garcia, 1994; Thomas & French, 1995; Nelson, Thomas, & Nelson 1991). Halverson, Roberton, and Langendorfer (1992) reported that with throwing and balancing, gender was as important as age in predicting the performance of the skill. Gender differences in motor performance occur as early as the preschool years (Garcia, 1994). Gender role expectations can also influence the movement behavior of young children (Garcia, 1994). Garcia (1994), and Payne and Isaacs (2002) consider gender
differences found in children’s movement behaviors to result from both biological and environmental factors.

The expectation for behavior based on gender starts early in childhood and is correlated with the child’s association with the parent of the same sex (Garcia, 1994; Payne & Isaacs, 2002).

**Children Considered Disadvantaged**

Children who are considered disadvantaged are those who are exposed to biological and/or environmental risk factors that increase their risk of developmental delay and/or educational failure. Many of these children live in vulnerable families and neighborhoods where the incidence of poverty, unemployment, substance abuse, and violence is widespread (Annie E. Casey Foundation, 2004). Research suggests that factors such as poverty and substance abuse may cause some children to experience developmental delays that may also lead to school failure (Annie E. Casey Foundation, 2004). Such risk factors, might adversely affect a child’s performance, motivation, persistence, and success at a variety of educational activities (Annie E. Casey Foundation, 2005).

There has been a nationwide concern for the growth and development of children who live in high poverty neighborhoods. Since it was founded in 1948, the Annie E. Casey Foundation (AECF) has worked to build a better future for children who are considered disadvantaged in the United States of America (USA). As part of their programs, the AECF conducts annual census on children who are considered disadvantaged.
Table 1.1 shows part of the 2000 census data on indicators of well-being and neighborhood characteristics as they relate to children in Ohio in comparison (AECF, 2005).

<table>
<thead>
<tr>
<th>Indicators of Child Well-Being</th>
<th>Trend Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1990</td>
</tr>
<tr>
<td>Percent low birth-weight babies</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Infant mortality rate (deaths per 1,000 live births)</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Child death rate (deaths per 100,000 children ages 1-14)</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Rate of teen deaths rate by accident, homicide, and suicide</td>
<td>OH</td>
</tr>
<tr>
<td>(deaths per 100,000 teens ages 15-19)</td>
<td>US</td>
</tr>
<tr>
<td>Teen birth rate (births per 1,000 females ages 15-17)</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Percent of teens who are high school dropouts (ages 16-19)</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Percent of teens not attending school and not working (ages 16-19)</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Percent of children living with parents who do not have full-time, year-round employment</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Percent of children in poverty (data reflect poverty in the previous year)</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
<tr>
<td>Percent of families with children headed by a single parent</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>US</td>
</tr>
</tbody>
</table>

Table 1.1 Indicators of Child Well-being in the State of Ohio in Comparison to the US.

<table>
<thead>
<tr>
<th>Neighborhood Characteristics</th>
<th>State</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children in neighborhoods with a high poverty rate (above 18.6%): 2000</td>
<td>16%</td>
<td>23%</td>
</tr>
<tr>
<td>Children in neighborhoods with a high rate of males not in the labor force (above 38.1%): 2000</td>
<td>10%</td>
<td>14%</td>
</tr>
<tr>
<td>Children in neighborhoods with a high rate of female-headed families (above 35.2%): 2000</td>
<td>20%</td>
<td>17%</td>
</tr>
<tr>
<td>Children in neighborhoods with a high rate of high school dropouts (above 14.7%): 2000</td>
<td>19%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Table 1.2 Neighborhood Characteristics in the State of Ohio in Comparison to the US
Data collected in 2004 by AECF found that some of the trends in these data were worse than in 2000 for example, the percentage of low birth-weight babies increased for 7.9% to 8.3%, children living with family where parents do not have full-time year round employment has increased for 25% to 33%, children who live in poverty has increased from 16% to 18% (AECF, 2005)

The information in Table 1.2 indicates that, many children in Ohio live in poverty. It is therefore anticipated that some of these children may experience developmental delays associated with the indicators of disadvantaged factors (AECF, 2005; Goodway, & Branta, 2003; Goodway & Rudisill, 1996; Hamilton, Goodway, & Haubenstricker, 1999). Many children who are identified as disadvantaged are served by early childhood intervention programs such as Head Start to develop the prerequisite skills for kindergarten (USDHHS, 2005). In recent years, a few researchers in motor development have begun to focus on young children who are disadvantaged believing that early-intervention preschool programs can positively impact the lives of children considered disadvantaged (Goodway & Branta, 2003; Goodway, Crowe, & Ward, 2003; Goodway & Rudisill, 1996; Hamilton et al., 1999).

**Motor Skill Intervention**

Research on young children considered disadvantaged has reported that delays exist in FMS development (Goodway & Branta, 2003; Hamilton et al., 1999). Additionally, research with preschool aged children has shown that developmental gains can be achieved within the psychomotor domain if direct quality instruction is provided (Goodway & Branta, 2003; Hamilton et al., 1999; Zittel & McCubbin, 1996). Motor skill
intervention, is very important for children with developmental delays and can be successful in developing motor skills through the use of quality physical education programming (Graham, Holt/Hale, & Parker, 2004). Motor skill interventions must therefore consider both developmentally and instructionally appropriate practice (Council on Physical Education for Children [COPEC], 1992, p.3).

The National Association for the Education of Young Children (NAEYC) refers to “developmentally appropriate” programs as those, which are based on knowledge of what is age-appropriate for the group of children served as well as information about what is individually appropriate (COPEC, 1992). In terms of physical education, developmentally appropriate practices are those that recognize children’s changing capacities to move and those that promote such changes (COPEC, 1992). By understanding the developmental characteristics of children, teachers will be in a better position to organize and implement their lessons to bring about positive change in FMS, thereby providing quality physical education (Rink, 1994; Sweeting & Rink, 1999).

Knowledge of the developmental characteristics of children will certainly affect individual teacher’s decisions about teaching style, grouping, equipment, and skills to be taught (Haywood & Getchell, 2002; Payne & Isaacs, 2005).

The education of young children has received much attention from educators including physical educators within the past decade (Goodway & Branta, 2003). Many early childhood professionals have expressed growing concern about inappropriate teaching practices and curriculum expectations with regard to young children in kindergarten and primary grades (Ames, 1992; Valentini, Rudisill, & Goodway, 1999).
The National Association for Sport and Physical Education (NASPE, 2002) defined a physically educated person as someone who demonstrates competence in a variety of manipulative, locomotor, and non-locomotor skills and who participates regularly in physical activity. As related to this definition, preschool educators must provide children with developmentally appropriate motor skill instruction in an effort to build a foundation for successful participation in later childhood and adult physical activities.

Knowledge of motor development may help educators to design developmentally appropriate activities to enhance the teaching and learning of movement skills to suit the age and ability of the individuals who participate in these activities (Stroot & Oslin, 1993). When teachers are able to clearly define and communicate tasks to students and provide cues as children perform, they are encouraged to develop at their own rate (Rink, 1994; Sweeting & Rink, 1999).

The teacher’s ability to analyze motor skills or movement patterns plays a vital role in teaching children to acquire skills (Stroot & Oslin, 1993). The teachers’ ability to do skill analysis also enables the teacher to provide appropriate skill related feedback and assess student achievement (Stroot & Oslin, 1993).

Research has shown that children who have had a wide experience in movement activities are better able to learn more challenging movements and to better acquire sport skills (Schmidt, 1988). Kogan (1982) also emphasized that organized physical education is beneficial to elementary school children. Physical education scholars have indicated that the earlier the instruction is introduced, the greater the gains and that early motor skill instruction bring about positive skill development of children (Conner-Kuntz, &
Knowledge of motor development regarding FMS can help educators design activities, diagnose delays in FMS, and intervene where necessary.

**Need for the Study**

To date, research on young children who are disadvantaged has shown that they experience developmental delays in FMS and are in need of motor skill intervention (Goodway & Branta, 2003; Goodway, et al., 2003; Goodway & Rudisill, 1996; Savage, 2002; Hamilton, et al., 1999). With motor skill intervention, however, significant gains in FMS were reported resulting in improvements in motor development (Goodway & Branta, 2003; Goodway, et al., 2003; Goodway & Rudisill, 1996; Hamilton, et al., 1999; Savage, 2002).

However, the majority of these motor skill interventions were presented using direct instruction. Additionally, much of the research on young children has also examined gender differences in preschool children and reported that males typically outperform females in object control skills (Garcia, 1994; Goodway, et al., 2003; Nelson, Thomas, & Nelson, 1991; Savage, 2002; Thomas & French, 1985). From a dynamical systems perspective the current study focused on the interaction of the two approaches, which represent the environment and interaction of the learner on tasks developed for the acquisition of object control skills.
Purpose of the study

The purpose of the study was to examine the influence of a nine-week direct instruction program and a nine-week mastery motivational climate program on the object control (OC) skills of preschoolers. From a dynamical systems perspective this study focused on the interaction of the learner (gender, skill level) and the environment (motor skill intervention) on the tasks of throwing, catching, kicking, striking, dribbling and rolling. The primary focus was to look at pre-to-post intervention changes in OC skill performance. Objectives of the study were:

1. To determine the developmental level of object OC skill performance of children at pre-intervention.
2. To determine the influence of gender on pre-intervention OC skill performance.
3. To determine the influence of the different interventions on OC skill acquisition.
4. To determine the interaction of gender and intervention on OC skill performance from pre to post intervention.

Research Questions

The following research questions guided this study:

Pretest Group Research Questions

1. What were the developmental levels of pre-intervention OC skill performance in Intervention Group 1, Intervention Group 2, and the Comparison group?
2. Were there any differences in OC skill performance between Intervention Group 1, Intervention Group 2, and the Comparison Group at pre-intervention?

Pretest Gender Research Questions
3. Were there gender differences in pre-intervention OC skill performance?

4. Were there gender differences within Intervention Group 1, Intervention Group 2, and the Comparison Group?

**Influence of the Intervention on Object Control Performance by Group**

5. Were there any differences in pre to post-intervention OC skill performance between Intervention Group 1, Intervention Group 2, and the Comparison Group?

6. Were there pre to post intervention differences in the OC skill performance in Intervention Group 1, and 2, and the Comparison Group?

**Influence of the Intervention on Object Control Performance by Group and Gender**

7. Were there gender differences from pre-intervention to post intervention OC skill performance?

8. Were there gender differences from pre-intervention to post-intervention within Intervention Group 1, or Intervention Group 2, or the Comparison Group?

**Limitations of the Study**

1. The primary researcher and facilitators had not worked with the children prior to the pretest data collection. The participants took a little while to adjust to the researcher and facilitators who served as their teachers. This may have influenced learning in the early stages of the intervention.

2. Graduate students were trained to be facilitators during the intervention. There were two different facilitators at the two stations and this may have effected selection of activity during the mastery motivational climate intervention.
3. The gymnasium was a multipurpose room so space restrictions limited the nature of some activities.

4. The researcher was one of two lead teachers for the intervention and thus experimenter effects may have occurred.

**Delimitations of the Study**

The findings from this study were delimited to preschool children enrolled in an urban mid-western Head Start. These findings are also delimited to the instruction of a nine-week OC skill intervention taught via direct instruction and mastery motivational climate.

**Definition of Terms**

*Attractors* – These represent preferred performance behaviors of an individual in a specific context (Caldwell & Clark, 1992; Ulrich, & Collier, 1990).

*Children considered disadvantaged* - These were children from low-income families who needed services in the areas of education and early childhood to increase their school readiness (USDHHS, 2000).

*Control Parameters* - Control parameters refer to the physical variables within systems or subsystems. As these variables change within the system, the behavior of the systems change. Changes of the system may be externally invisible until the system reaches a critical point and a phase shift occurs. Control parameters do not control the system; rather the system is sensitive to change of the control parameters (Caldwell & Clark, 1992; Ulrich, & Collier, 1990).
Constraint - Constraints are boundaries or features that limit motion and reduce the number of possible configurations of a system. Constraints may promote or restrict performance (Newell, 1986).

Degrees of Freedom - These are number of variables within a system that are free to vary. As an individual performs a task, degrees of freedom within each of the subsystems interact, resulting in collective degrees of freedom, which are less than the sum of the degrees of freedom of each of the subsystems. As an individual is exposed to certain conditions and/or tasks, the degrees of freedom within the subsystems no longer act individually. The degrees of freedom are reduced as subsystems cooperate (Caldwell & Clark, 1992; Ulrich, & Collier, 1990).

Developmentally appropriate - It is the educational practice that recognizes the varied and individual capacities of children, and accommodates these characteristics within the instructional environment (COPEC, 1992).

Feedback (verbal and non verbal) - Verbal statements an individual receives as a result of a response (Rink, 1998).

Modeling - Any “antecedent stimulus that is topographically identical to the behavior the teacher wants imitated” (Cooper, Heron, & Heward, 1987, p. 366).

Manual manipulation – This is the physical guidance of the body to assist the child with the proper idea of what is to be done (Siedentop, Herkowitz, & Rink, 1984).

Fundamental Motor Skills (FMS) – FMS refers to basic, observable patterns of motor behavior that should be developed in childhood. Fundamental motor skills include locomotor and object control skills (Gallahue & Ozmun, 2005).
Object Control Skills (OCS) - These skills make up the category of FMS that require object manipulation and include throwing, catching, kicking, rolling, striking and dribbling (Gallahue & Ozmun, 2005; Ulrich, 2000).

Opportunity to Respond (OTR) – OTR refers to the measure of the number and rate of appropriate, successful responses made by students. A response is “appropriate” if its major critical elements were in compliance with the lesson activity. It is “successful” if it conforms to the expectation of the teacher in the context of the practice activity (Siedentop & Tannehill, 2000).

Phase Shifts - A phase shift occurs as a system transforms from one qualitatively different attractor state to another (Caldwell & Clark, 1992; Ulrich & Collier, 1990).

Subsystem - Components of a human system that are constantly interacting or changing that combine to affect the system (Caldwell & Clark, 1992; Ulrich, & Collier, 1990).
CHAPTER 2

LITERATURE REVIEW

This study used dynamical systems theory (DST) and Newel’s constraints model as a framework for the review of literature (Newell, 1984; Thelen & Ulrich, 1991). The DST provides insight into the dynamic nature of motor skill development. The review of the literature provides an overview of: (a) dynamical systems theory, (b) fundamental motor skills, (c) motor skill intervention literature, (d) the role of feedback and cues in the acquisition of motor skills, and (e) children considered disadvantaged.

Theoretical Framework

Dynamical systems theory is a framework that seeks to explain changes that occur during motor skill performance and the underlying factors that influence the skills (Magill, 2005; Newell, 1984; Thelen & Ulrich, 1991). Movement, according to this theory, is considered as deriving from a complex and multifaceted interaction among the individual, the task, and the environment (Newell, 1984). Fundamental motor development is influenced by the interaction of cooperating subsystems (Gallahue, 1987; Ulrich & Ulrich, 1993).
Dynamical Systems Theory

Dynamical systems theory considers the individual as a system comprising of multiple interacting subsystems such as the individuals’ experience, abilities, strength, and motivation, resulting in a product that is the result of the interaction of these subsystems (Gallahue, 1991; Ulrich & Ulrich, 1993). A change in one subsystem could influence the outcome of overall performance. Factors such as difficulty of task, the size and weight of equipment, the nature of playing area, and the individuals’ skill level are examples of subsystems that influence performance (Newell, 1984).

From the dynamical systems perspective, movement patterns do not develop in a series of highly predictable movements or levels, instead patterns may change over time with some probabilities (Clark & Philips, 1993; Garcia & Garcia, 2002). Human movement involves many potential movement patterns, degrees of freedom, and these variables within the system are free to vary as movement occurs. Specific patterns are involved in developing specific motor skills. Degrees of freedom within a task subsystem must be reduced to offer stability to the movement. The stable pattern of behaviors that are observed across multiple trials and task conditions are called behavioral attractors (Clark & Philips, 1993; Langendorfer & Roberton, 2002). Behavioral attractors are common patterns of movement occurring under specific conditions (Clark & Phillips, 1993). The resulting stable behavior will be stable to the degree that the cooperating subsystems continue to act together (Thelen & Ulrich, 1991). Attractor pathways are the common patterns that change over time (Hamilton & Tate, 2002).
Attractor states are not always stable and they may change with time due to changing relationships between subsystems or changes in constraints that also change with time (Hamilton & Tate, 2002).

Dynamical systems theory suggests that cooperating subsystems are driven to self-organize and reduce the degrees of freedom that result in a more stable movement. When the individual is driven to a new attractor state or movement pattern, a control parameter initiates a perturbation that prompts the individual to move from an old inefficient movement pattern to a more stable and efficient movement form (Thelen & Ulrich, 1991).

Control parameters are physical variables within systems or subsystems. As these variables change with the system, the behavior of the system also changes. Examples are motivation experience gained from practice and strength. Dynamical systems theorists refer to this process as a phase shift. Phase shifts are the result of gradual or sudden changes in variables or subsystems that make the body move from one pattern to another.

During the process of a phase shift a lot of variability is observed in the individual’s performance, but as the movement is stabilized into new patterns, performance changes (Garcia & Garcia, 2002). Sometimes a phase shift will bring about more efficient patterns of movement and in other situations phase shifts result in a regression in the movement pattern (Garcia & Garcia, 2002). For example, a child learning to catch may be scooping to catch balls tossed to him or her. But as the learner is continuously prompted to get the hand out in front, keep eyes on ball and catch with the hands; within a few trials the child starts to catch with the hands.
The control parameter in this instance is the act of the hand and tracking of the ball with the eyes. The child is now catching with the hands and this becomes the new attractor state. Control parameters are believed to be primarily responsible for the changes in movement performance. These could be variables, that when altered, allows the system to re-organize itself in a different way (Langendorfer & Roberton, 2002). Control parameters do not necessarily have to be task related but could be biomechanical or environmental factors. Parameters can be identified, by determining the essential variables of a skill or task (Southard, 1998). Some examples are size and weight of equipment, degree of difficulty of task, and the environment in which the task will be performed. These may cause the individual to reorganize movement patterns when scaled to a critical value to achieve a stable movement pattern.

Constraints Model

Constraints are defined as boundaries, parameters, or features that limit motion and reduce the number of possible configurations of a system (Newell, 1984). These constraints, according to Newell (1984), can serve to promote or limit motor development. Newell (1984) identified three constraints (learner, task, and environment) that act upon the child which go a long way to determine the acquisition of fundamental motor skills and movement patterns.

Learner or organismic constraints can include factors such as body weight, strength, height, and balance (Garcia & Garcia, 2002; Southard, 1998). Task constraints can include the goal of the task, rules, and the equipment available. The environmental constraints are those that are external to the child such as temperature, the surface of play
area, indoor or outdoor facility (Newell, 1984). Newell explains that, individuals’ motor responses are a result of the interaction of the constraints in a given context.

Newell’s constraints perspective provides a guide for teachers in developing instructional strategies in order to enhance the motor development of children. Although instruction was not clearly identified as a task or environmental constraint, teachers can manipulate the task constraints, clarify the task, and arrange the environment to be convenient for practice. The opportunities offered a child to practice a skill and the quality of the instruction that goes with it would be considered a constraint on the outcome of the movement.

For this study, instructional strategies were considered environmental constraints. That is, the type of instruction, direct or mastery motivational climate, constrained the emergence of object control (OC) skills. Task constraints were determined according to the activities for OC skills. A hierarchical instructional task analysis was used in developing tasks for the intervention and so the task constraint differed from task to task.

**Fundamental Motor Skill**

Fundamental motor skills are considered the building blocks of movement, specific sport, games, and other sports skills for later in childhood (Clark, 1994; Gabbard, 2000; Haywood & Getchell, 2002; Payne & Isaacs, 2005).

Fundamental motor skills when developed at early childhood form the basis for later movement and physical skills (Payne & Isaacs, 2005). Fundamental motor skills include: jumping, running, skipping, hopping, sliding, walking, catching, throwing,
striking, dribbling, kicking, and rolling. These skills are categorized as object control (OC) skills or locomotor skills.

Object control skills involve the manipulation of objects such as in kicking and throwing (Payne & Isaacs, 2005; Ulrich, 2000). Locomotor skills involve moving the body from one point to another such as in running and hopping (Payne & Isaacs, 2005; Ulrich, 2000). These skills enable the child to control different body parts, manipulate their environment and perform complex skills and movement patterns involved in sports, dance, gymnastics, and other activities (Gallahue, 1987; Seefeldt, 1982). For example an OC skill such as catching is the basic activity or skill used in games like basketball, baseball, and football.

By learning to catch the child develops coordination, balance, and timing. These factors influence the child’s success in playing games and activities that may involve catching.

*The Importance of Fundamental Motor Skills*

Fundamental motor skills do not naturally emerge as mature patterns of movement rather they must be taught and practiced (Gabbard, 2000; Newell, 1984). Fundamental motor skill development is crucial in the overall development of the child (Gallahue, 1987).

Motor development involves changes in motor behavior throughout the lifespan, as well as the processes responsible for these changes (Clark, 1994; Ulrich, 2000). Children who develop motor skills at an early age grow in confidence and are likely to participate in youth sports and physical activity (McKenzie et al., 1998). On the other
hand, children who develop poor FMS may not be motivated to participate in sport and games due to their lack of the basic skills (Seefeldt, 1982). Their incompetence may cause them to abandon or reject sports, and this may lead to an inactive lifestyle (Browning & Shack, 1990; McKenzie et al., 1998; Payne & Isaacs, 2005).

Early childhood and the early school years have been identified as the time frame that FMS emerge and evolve (Ulrich, 2000). Seefeldt (1987) suggested that children must develop FMS to a certain proficiency level to be able to perform more complex movement skills. Developing skills and proficiency in FMS could lead to physical, social, and emotional benefits and may result in a more active and healthy lifestyle (Gabbard, 1995; McKenzie, Alcaraz, & Sallis, 1998). Guidelines of the National Association of Physical Education (NASPE) suggest that preschoolers should develop competence in movement skills that are building blocks for more complex tasks (NASPE, 2002).

The school environment is where children learn FMS, and physical education programs provide opportunity for children to practice and develop motor skills (Graham, Holt/Hale, & Parker, 2005). It is therefore important that early and effective instruction is used to develop and correct movement patterns so that children can acquire advanced movements used in sport and dance activities.

**Measurement of Fundamental Motor Skills**

Fundamental motor skills are believed to develop in developmental sequences (Roberton, 1978). Two approaches have been identified for the development of FMS. This is the total body approach (Haubensticker, Branta, & Seefeldt, 1983) and the component approach (Roberton, & Halverson, 1984). The total body approach describes
movement that the entire body unit is performing as a single stage. This approach uses stage theory as its framework.

Stage theory refers to the emergence of specific patterns of movement in infancy and childhood as stages of development (Roberton, 1978). Stages of development assume predictable, invariant, and universal sequence of movement patterns. The component approach suggests that there are stages of development within the different body components that produce the movement (Roberton & Halverson, 1984). For example, Roberton and Halverson (1984) identified five components of the overarm throw as step, trunk, backswing, humerus, and forearm. Within the component approach, change in component levels may occur at different times and at different rates.

Ulrich (2000) identified another approach for measuring FMS. This approach identified criterion elements of form necessary for efficient and effective skill performance. This approach identified the elements of how body parts are coordinated during the performance of the skill rather than assessing the end of the performance.

For example, criterion elements for overarm throw include: (a) windup is initiated with downward movement of hand/arm, (b) rotation hips and shoulders to a point where the non throwing side faces the wall, (c) weight is transferred by stepping with the foot opposite the throwing hand, and (d) follow-through beyond ball release diagonally across the body toward the non preferred side (Ulrich, 2000).

The Test of Gross Motor Skill Development-2 (TGMD-2, Ulrich, 2000) identified criterion elements of FMS for assessing children aged 3-10 years. The TGMD-2 measures how children coordinate their trunk and limbs during the performance of a task.
rather than assessing the end results such as how fast children run or how far they throw. This instrument is used to assess six locomotor skills (run, gallop, hop, leap, horizontal jump, and slide) and six OC skills (striking a stationary ball, stationary dribble, catch, kick, overhead throw and underhand roll). The selected test items on TGMD-2, represents the most common skills children acquire during preschool and early elementary school years (Ulrich, 2000). The TGMD-2 can be used as a programmatic guide or as a research tool.

When the TGMD-2 is used in assessing motor skill, specific strengths and skill deficiencies can be identified. The measures obtained on skills can help teachers design developmentally appropriate instructional programs for children in school. Also, based upon individual results, specific motor programs or interventions can be prescribed for children.

As a research tool, the TGMD-2 can be used to investigate pre-intervention to post-intervention gains in motor skills after an intervention and can be utilized to study the motor development of different groups of children from different cultures, regions, or schools. The reliability for internal consistency coefficients for the TGMD-2 OC subscale range from .85 to .92. In order to reduce ethnic, gender, and/or linguistic bias, the TGMD-2 was also tested on diverse groups and normed on a stratified sample of children including females, males, African Americans, Asian Americans, European Americans, and Hispanic Americans (Ulrich, 2000). The OC subscale reliability for these groups range from .92 to .95, demonstrating that the TGMD-2 is similar in reliability for all of the varied groups tested (Ulrich, 2000).
Gender Differences in Fundamental Motor Skills

Gender differences have been found in the acquisition and performance of FMS particularly OC skills (Goodway & Branta, 2003; Payne & Isaacs, 2005). Throwing has been identified as the FMS typically with the largest gender differences in performance (Thomas & French, 1985; Williams, 1996). Haubenstricker and Seefeldt (1983) also found some gender differences in striking and kicking. Gender differences in the acquisition and development of OC skills may be attributable to both biological and environmental sources (Nelson et al., 1986).

Biological factors influencing OC skill performance are individual constraints such as anthropometric characteristics and neuromuscular coordination. Environmental factors impacting OC skill performance include socialization, opportunities to practice, and differential effect of instruction. However, biological factors in gender differences in preschool children have not been reported in the motor development literature. But it is interesting to know that as children grow, biological factors can be used to explain some gender differences (Nelson, Thomas, & Abraham, 1986). Nelson et al. (1986) suggested that biological factors play a greater role in gender differences than environmental factors.

Adolescent boys have been found to have longer limbs for propulsion, wider shoulders, and more narrow hips for faster rotation, and more muscle mass for increased force as compared with girls (Nelson et al., 1986, 1991; Payne & Isaacs, 2005). Girls on the other hand, tend to have higher levels of body fat than boys (Nelson et al., 1991).
Nelson and colleagues (1991) found that more specific biological measures have been correlated with gender differences that included moderate correlation between boys’ arm muscles and distance thrown. Boys have been found to have greater external to internal rotation rate and girls have less of a maximum angle of twist (Thomas & Marzke, 1992).

Gender roles and gender identification play a key role in the sociocultural influence. Nelson et al. (1991) determined that the presence of a male adult in the home may serve as a significant predictor of throwing performance. East and Hensley (1985) found that the presence of a father figure to direct his daughter’s play activities accounted for at least 25% of the variance in motor skill performance. Data on gender showed that male participation rates surpass those of females, perhaps due to the lack of female mentoring and coaching offered to girls (Seefeldt & Ewing, 1997).

Negative experiences in physical education class as well as body image concerns may also deter girls (aged 12-15 years) from participation in activity (Taylor et al., 1999). Activity programs providing social support and fun seem to be especially important for female participation (Taylor et al., 1999). Garcia and Garcia (2002) noted that girls seemed to be motivated to perform by the desire to please the teacher and were interested in the teacher’s verbal encouragement, rewards, and smiles. Boys were more motivated by the performance oriented context and their performance rather than the teacher interactions. Performance factors have been noted as having greater influence on more proficient movers.
Children Considered Disadvantaged

There is a nationwide concern about the number of children and families who are living in poverty (AECF, 2003). The Annie E. Casey foundation is a national foundation dedicated to providing services to improve the lives and well being of children. The Annie E. Casey foundation (AECF, 2003) provides annual indicators of child well being and neighborhood characteristics that affect people living in poverty in the USA. These indicators provide both national and state level data to chart the welfare of children growing up in poor families.

National data from the 2000 census reveal that 16% of children in Ohio grew up in poverty (AECF, 2003). From 1990-2000, Ohio’s rate of children living in families with parents who do not have full time, year-round employment surpassed the national average of 24% to reach 25% (AECF, 2003). These data showed that 30% of children in Ohio lived in single parent homes.

The rate of Ohio children who lived in extreme poverty (income below 50% of poverty level) was the same as the national average of 8%. Plus, Columbus was ranked 19th of 50 large cities nationally on this measure (AECF, 2003). The teen dropout from school in Ohio was 8% and the national dropout rate was 9%. Dropout rates for children who live in neighborhoods with high poverty were at 16% in Ohio and 23% for the national average.

The AECF (2003) reported that, children growing up in severely stressed neighborhoods were less likely to perform well in school, were more susceptible to teenage pregnancy, and less likely to make a smooth transition to the work force. The
report indicated that Black and Hispanic children form about one-third of all children in the USA, but they made up more than three-fourths of all children living in severely distressed neighborhoods. The report also indicated that Black children were 20 times as likely as non-Hispanic, White children to live in severely distressed neighborhoods, and Hispanic children were about 10 times as likely as non-Hispanic, White children to live in a severely distressed neighborhood.

Columbus, OH was ranked 19th of 50 large cities for the percent (15%) of children under 15 years of age living in distressed neighborhoods (AECF, 2003). Census statistics indicate that many children growing up in Ohio are exposed to environments that may be detrimental to their development and health.

One of the reasons that poverty is a concern is that poverty is strongly associated with physical inactivity (USDHHS, 1996, 2000).

National data indicates that physical activity rates decrease as income levels decrease this is particularly true for people of color (USDHHS, 1996, 2000). Moreover, children from poor, urban families face many challenges to lead a physically active lifestyle while striving to overcome the burden of poverty (Goodway & Smith, 2005; USDHHS, 1996, 2000).

The poor and minority populations have been specifically identified as needing interventions to promote physical activity by the Center for Disease Control and Prevention because they appear to be disadvantaged by current physical education programs, and demonstrate significant needs both as children and as adults (Goodway & Smith, 2005; USDHHS, 1996; 2000). It is the responsibility of physical education
teachers to make sure they help children develop motor skills through physical education to make them aware of the importance of an active lifestyle.

**Head Start Programs.** Head Start and early Head Start are comprehensive child development programs that serve children from birth to 5 years of age. They are child-centered programs and have the overall goal of increasing school readiness of young children from low-income families (Head Start Bureau, 2005). Head Start programs were created and designed to break the cycle of poverty by providing preschool children and their families with a program to meet their social, health, nutritional, and psychological needs (USDHHS, 2000).

Children are accepted into Head Start programs when they meet the low-income criteria. The State of Ohio had 38,017 Head Start programs (USDHHS, 2000) and ranks 5th highest in enrollment in the USA.

Children from Head Start programs were selected in this study because the motor development literature suggests children need to learn FMS early so as to enable them acquire the basic movement skills for future activities (Goodway & Branta, 2003; Payne & Isaacs, 2005).

Secondly, physical education is not part of the Head Start curriculum and so findings from this study could be used to provide a rationale for including physical education in Head Start programs. Additionally, many of the children served by Head Start programs are those identified as being particularly at risk for physical inactivity and in need of intervention (USDHHS, 1996, 2000).
Motor Skill Intervention

Importance of Motor Skill Intervention

The development of fundamental motor skills in children during early physical education experiences is important because it influences the attitude of children towards physical activities later in life (Goodway & Branta, 2003). Research has shown that some children who come from poor homes and live in urban environments demonstrate developmental delays in motor skill at the time they enter school (Goodway & Branta, 2003; Goodway & Rudisill, 1997; Goodway, Crowe et al. 2003; Hamilton et al., 1999).

Goodway and Branta (2003) found significant pretest-posttest gains in FMS in preschool children receiving a 12-week motor skill intervention. There were 31 participants in the intervention group and 28 participants in the control group. The intervention was carried out over 12-weeks and covered locomotor and OC skills. A direct instructional approach was used and each intervention session lasted 45-minutes. Participants in the motor skill intervention group improved significantly in both locomotor and OC skills after the intervention as compared to the control group that did not improve.

Goodway and Rudisill (1997) reported that 59 African American male and female preschoolers who were considered at risk of developmental delay were at the 5th and 9th percentiles respectively for locomotor skills and at the 16th and 5th percentiles for OC skills respectively. They suggested that these children started Head Start with developmental delays in FMS.
Hamilton et al. (1999) in a similar study with preschool children considered at risk of developmental delay also demonstrated delays in OC skills prior to the intervention. There were 15 participants in the experimental group and 12 in the control group. In that study, parents played the role of teachers. They were trained to implement lesson plans for the intervention. After an eight-week parent-assisted motor skill intervention, children in the intervention group demonstrated object control skills at the 67th percentile and children in the control group performed at the 15th percentile. The authors concluded that children started the intervention developmentally delayed but after receiving instruction, they significantly improved their OC skills performances.

Connor-Kuntz and Dummer (1996) conducted an intervention study with children in a Head Start program. There were 11 typically developing preschool children, and 26 were developmentally delayed.

Connor-Kuntz and Dummer reported that after an eight-week motor skill intervention, there was significant improvement in the FMS of all the participants.

Fundamental motor skills have to be practiced in order for the child to learn the skills (Gabbard, 2000; Haywood & Getchell, 2002; Newell, 1984). Unfortunately, some children who are considered disadvantaged may not have the environmental support needed for the development of FMS (Goodway & Branta, 2003; Goodway & Rudisill, 1997; Goodway & Smith, 2005; Hamilton et al., 1999). Their community, streets, and playgrounds may not be safe for play or motor activities (Goodway & Branta, 2003; Goodway & Smith, 2005; Hamilton et al., 1999). Many children growing up in poverty often do not have the opportunities to practice motor skills, and therefore, face many
challenges to being active and developing motor skills (Goodway & Rudisill, 1996). The conditions, under which these children considered disadvantaged live, make it necessary for teachers to use motor skill intervention to provide quality programs so they will more readily acquire motor skills (Goodway & Branta, 2003; Graham, Holt/Hale, & Parker, 2005). The Council on Physical Education for Children (COPEC, 1992) suggests that such motor skill programs should be developmentally appropriate and must include instructionally appropriate practices.

The ability of teachers to provide early motor skill instruction can bring about positive changes in the motor skill development of children. Valentini (1997) investigated the role of a motor development intervention on kindergarten children 37 who were developmentally delayed.

Valentini (1997) found that a 12-week student-centered and teacher-centered instruction program resulted in significant gains in FMS performance (measured by the TGMD). The pre-intervention scores were at the 5\textsuperscript{th} percentile for both groups. The post-intervention scores for the student-centered group were at the 84\textsuperscript{th} percentile and that of the teacher centered was 75\textsuperscript{th} percentile. The comparison group of kindergarten children did not improve significantly, although all three groups were provided daily physical education. Valentini did not examine gender differences.

Savage (2002) also investigated the effect of an eight-week motor skill intervention on the motor skill development of pre-school and kindergarten children. The intervention group was 36 and the comparison group was 47. Both groups demonstrated developmental delays in OC skills at pre-intervention. The post-intervention data
indicated that there was improvement in OC skills. Savage, however, reported gender differences in the pre-intervention object control scores, with boys scoring higher than girls. But these differences were not found in the post-intervention scores.

In summary, findings from the above studies demonstrate that young children who are disadvantaged demonstrate developmental delays in FMS. Additionally, when provided with motor skill intervention, these children make remarkable and significant gains in their FMS performance. Without motor skill intervention, children considered at disadvantage will continue to be deficient in motor skills.

**Mastery Motivational Climate**

In recent times, physical educators have been concerned about motivating students to actively participate in physical activities. Research has shown that as children grow older their participation and interest in physical education decreases (Van Wersch, Trew & Turner, 1992). Additionally, the 1996 Surgeon Generals report (U.S. Department of Health and Human Service, 1996) revealed that regular physical activity can prevent disease and improve the quality of life (USDHHS, 1996, 2000). Some physical educators have suggested that there should be more focus on enhancing the motivation of children during physical education classes (Valentini, Rudisill, & Goodway, 1999). A number of studies on human motivation have used a social cognitive approach in explaining how learning is enhanced through motivation (Ames, 1987, 1992a; Dweck, 1986; Nicholls, 1984).
Social cognitive approach to motivation is “built around the expectances and values that individuals attach to different goals and achievement activities” (Roberts, 1992, p. 11). The emphasis is on cognitive mediators, that is, how individuals construe, interpret, and process information about the situation (Dweck, 1984).

The social cognitive approach has incorporated a number of motivational models such as self-efficacy, perceived competence, and various goal-oriented achievement perspectives. Valentini, Rudisill, and Goodway (1999) elaborated on how the goal-oriented perspective relates to motivation within the physical education context suggesting that a mastery motivational climate was one way to promote achievement motivation in young children in physical education. According to Ames (1992), central to performance goal orientation is: (a) a focus on individual ability of self-worth, (b) where ability is evidenced by doing better than others, (c) by achieving successes with little effort.

Consequently, ability and effort are seen as inversely related. It has been noted that individuals who are oriented towards performance goals seek to obtain a positive judgment and avoid negative judgment about their performance (Dweck, 1986). They compare their own performance and effort with others. They are motivated to seek public self-awareness (Nicholls, 1984).

Researchers suggest that a personal orientation toward mastery or performance goal patterns may lead the learner to engage in different motivational patterns in response to task difficulty (Ames, 1992b, Ames & Acher, 1988; Dweck, 1986, Dweck & Legget, 1988; Nicholls, 1992a, 1992b). Seifriz, Duda, and Chi (1992) suggested that an adaptive
motivational pattern would be observed among individuals who are performance goal oriented, as long as their perceived abilities are high.

But on the other hand, an adaptive motivational pattern will be observed among the mastery goal oriented individuals, regardless of their level of competences.

It has also been found that, children who display the adaptive patterns of motivation behavior, focus on strategies when they encounter failure. Their expectations for future performance remains positive, their persistence is maintained and often increased, and their performance improves (Seifriz, Duda & Chi 1992). In addition, they adopt a challenge-seeking attitude. The children experience a positive affect at the achievement situation. On the contrary, children displaying the maladaptive patterns quickly indicate their ability when encountering failure. They have negative expectations about their future performance, and they demonstrate decrease in persistence and performance, and avoided challenges. They try to withdraw from the achievement situation (Burhands & Dweck 1995; Dweck, 1975).

**Classroom Structure and Motivational Climate**

According to Ames (1992a), a teacher can encourage a particular goal orientation by making certain cues, rewards, and expectations salient. A motivational climate is established when the teacher structures the classroom to convey certain goals based on the context of the learning environment. Walling, Duda, and Chi (1993) also explain the motivational climate as the predominant structure that is perceived by the learners to be operating in the environment. This climate influences the goals that the individual adopts as well as their perceptions, attitudes, and behaviors. Ames (1992a; 1992b) examined and
described instructional environments in terms of how they influence the learners; motivation and goal orientation, which in turn affects the quality of the students’ engagement in learning.

Ames (1992a, 1992b) developed an intervention to foster this climate based on six dimensions of the classroom structure, known as TARGET: task, authority, recognition, grouping evaluation, and time structures. Valentini, Rudisill, and Goodway (1999) suggested that the structures proposed by Ames (1992b) could be implemented in physical education settings. Table 2.1 describes the structures and types of motivational strategies.

*Task Structure*

This includes the content and sequence of the curriculum, the design of classroom work and homework, difficulty of the task and the materials required to finish assigned tasks (Epstein, 1998, 1989). These educational task structures largely determine the range of options from which learners select their special interests.

It is suggested that teachers structure tasks to provide challenge to both fast and slow learners so as to foster mastery goals in all kinds of learners (Raffini, 1993).
<table>
<thead>
<tr>
<th>TARGET Area Descriptions</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task</strong></td>
<td></td>
</tr>
</tbody>
</table>
| • Design tasks – Instructional activities and homework | • Design activities for variety, individual challenge, and active involvement. Provide a “slanted rope effect”  
• Help Children set realistic goals. |
| **Authority**            |            |
| • Student participation in the instructional process | • Involve children in decision-making and leadership roles.  
• Help students develop self-management and self-monitoring skills. |
| **Recognition**          |            |
| • Identify reasons and opportunities for recognition | • Recognize individual progress and improvement  
• Assure equal opportunities for rewards  
• Focus on each child’s self-worth. |
| **Grouping**             |            |
| • Manner and frequency of students working together | • Use flexible and heterogeneous grouping arrangements.  
• Allow for individual choice of grouping.  
• Provide for multiple group arrangements.  
• Use specific criteria involving individual progress, improvement and mastery. |
| **Evaluation**           |            |
| • Standards for performance  
• Monitoring of performance  
• Evaluative feedback | • Involve children in self-evaluation via task sheets and peer and self-check  
• Make evaluation personal and meaningful |
| **Time**                 |            |
| • Schedule flexibility  
• Vary space of learning  
• Management of classroom | • Provide opportunities for and time for improvement  
• Help children establish work and practice schedules  
• Allow children to individualize instruction. |

Source: Ames (1992a)

Table 2.1 Description of TARGET Areas and Motivational strategies

**Authority Structure**

The classroom authority structure influences the nature of decision making between teachers and students. Teachers and students share responsibilities of making
choices, giving directions, monitoring work, setting and reinforcing rules, establishing
rewards, and the evaluating success. Sharing classroom control can influence the
students’ commitment to the learning process.

Recognition Structure

This involves the “formal and informal use of rewards, incentives, and praise in
the classroom” (Ames, 1992a). The purpose of recognition is to foster feelings of self-
esteeem by focusing attention on the positive achievement of each learner. Recognition
can also help develop a sense of group relatedness and cohesion (Raffini, 1993).

Grouping structure

The grouping structure determines whether, how, and why students who are
similar or different in particular characteristics such as gender, race, ability, goal, interest,
etc, are brought together or kept apart for instruction, play, or other activities. Schools
guide the learners’ contact and interaction in peer and friendship groups by so doing they
are motivated to learn (Epstein, 1986, 1988, 1989). Teachers can enhance learners’
motivation towards a mastery orientation by providing flexible and heterogeneous
grouping arrangements and allowing students multiple grouping opportunities (Ames,
1992a; Epstein, 1988).

Evaluation Structure

According to Epstein (1988), students’ high level of understanding about their
own effort, abilities, and improvement can be achieved throughout an effective
evaluation structure. The structure should contain challenge, yet attainable standards, fair
and clear procedures for monitoring progress, and explicit and frequent information about
progress. Strategies that foster students’ mastery orientation include: (1) using criteria for individual progress, improvement and mastery; (2) providing evaluative feedback; (3) involving children in self-evaluation, making evaluation private and meaningful; and (4) creating reasonable opportunity for students to experience success from their efforts.

**Time Structure**

The time structure deals with the appropriateness of the workload, the pace of instruction, and the amount of time allocated to completing learning tasks (Ames, 1992b). Teachers should incorporate a flexible schedule for learners of different abilities by providing enough instructional time for students to learn skills and complete assignments (Ames, 1992a; Epstein, 1989). Strategies such as providing opportunities and time for improvement, and helping students establish work and practice schedules will foster motivation.

The six TARGET structures provide the framework around which a mastery orientation may be implemented in the classroom context. By careful planning and manipulation of the TARGET structures, teachers can plan to engage students in a mastery climate.

**Effective Intervention**

Developmentally and instructionally appropriate teaching emphasizes such principles as: (a) provision of sufficient and suitable practice toward the learning goal, (b) providing a variety of tasks for learner success, (c) clearly communicating tasks and outcomes to learners, (d) selection of critical elements and corresponding cues of performance, and (e) also encouraging students to develop at their own rate (Rink, 1994;
Developmentally appropriate practice recognizes the varied and individual abilities of children, and accommodates these characteristics within the instructional environment (COPEC, 1992). Instructionally appropriate practice considers what is currently known regarding best instructional practice through documented research (COPEC, 1992).

The physical education curriculum should be based upon goals and objectives that are appropriate for all children and planned to include rhythms, dance, skills, concepts, and experiences designed to enhance physical as well as cognitive and social development (Graham et al. 2005). Children should be allowed the opportunity to practice skills and experiences at high rates of success, and activities should be based upon individual skill levels (Metzler, 1985). Siedentop and Tannehill (2000) suggested a match should be provided between student skill level and the task difficulty that would lead to a higher success rate and consequently higher motivation and esteem levels. Additionally, students are more likely to engage in mastery motivated learning when the tasks provided are interesting, meaningful, and relevant (Ames, 1992; Valentini, et al., 1999).

Content development, that incorporate task and skill analysis for identification of patterns of movement, and arrangement of instructional tasks with clear progressions of scope and sequence should contribute to effective instruction (Stroot & Oslin, 1993; Rink et al. 1991).
Providing multiple levels within tasks aids children in not becoming overly frustrated with tasks that are too difficult, but also in learning to challenge her/him self to find complex solutions. Student effort should be rewarded (Ames, 1992; Valentini et al., 1999).

Children should be provided equitable access and opportunities to participate in activities of all types. Children should be encouraged, supported, and socialized to master goals and achieve success irrespective of gender (Graham et al. 2005). From a physical education perspective, Hutchinson (1993) encouraged teachers to examine their beliefs and expectations in order to help children make positive strides in the gymnasium. She suggest minimizing public comparisons of students, discouraging ability and gender grouping, maximizing fairness and cooperation, and promoting an equitable school environment for all students. Teachers who are aware of and utilize such procedures in motor skill instruction are likely to positively affect student learning and acquisition for both girls and boys (Rink, 1994; Rink et al., 1991; Sweeting & Rink, 1999).

Teachers should select and clearly communicate specific cues related to the task goals for content presentation and teacher feedback statements (Rink, 1994; Siedentop & Tannehill, 2000). If the teacher has selected and presented these cues appropriately, there should be a direct relationship to the quality of student responses (Werner & Rink, 1989). Cues are necessary in teaching motor skills, and cues focus the child’s attention on the key elements of the movement. Attention is typically high for beginning learners, and cues can help them focus on the key elements so they are not distracted by irrelevant stimuli. Cues allow the teacher to minimize information overload and use the principle of
keep it short and simple (Graham et al., 2001). Short phrases and cues allow students to form a mental picture of a movement to be performed (Parson, 1998).

The following guidelines have been provided by Fronske (1997) to be considered when using critical cues: (a) formulate and prioritize cues, (b) keep cues and total number of cues compact and concise with three effective cues being sufficient, (c) give only one cue at a time, (d) provide critical cues along with appropriate feedback at appropriate times, (e) supplement with other positive encouragement. It is important that the learner get the critical features quickly in easily understandable terms that they can understand and to which they can relate. For this study the primary researcher will follow the above guidelines to develop appropriate cues for tasks that will be used during the OCS intervention.

Summary

Dynamical systems theory suggests movement is a product of the interaction of multiple subsystems that influence motor performance. The theory also considers the factors underling movement skills. The learner, the task, and the environment are the main factors that affect motor skill acquisition. Children who are considered at disadvantaged have been identified as having developmental delays in fundamental motor skills due, in part, to their socio-economic background. Early school years have been recommended for the acquisition of fundamental motor skills.

Motor skill interventions with young children have shown that children are able to learn FMS at an early age. In most cases, direct instruction was used and a variety of interveners implemented the programs (physical education teachers, peers, or parents).
When interventions were implemented, positive motor and psychological benefits were found for the participants.

Emerging research has found that a mastery motivational climate using TARGET structures brings about positive changes in motor skill development. However, the research in this area is limited and it is necessary to compare instructional approaches and consider the best way to intervene with young children with the hopes that such intervention will promote motor skill development and start children on the road to an active lifestyle.
CHAPTER 3

METHODOLOGY

The purpose of the study was to examine the influence of a nine-week direct instruction program and a nine-week mastery motivational climate program on the object control (OC) skills of preschoolers. From a dynamical systems perspective this study focused on the interaction of the learner (gender, skill level) and the environment (motor skill intervention) on the task of throwing, catching, kicking, striking, dribbling, and rolling. The primary focus was to look at pre-to-post intervention changes in OC skill performance.

This chapter outlines the theoretical framework and the methodology and procedures that were employed during the study. First, the theoretical framework was explained then the research design and variables are presented. The following are also explained: context, participant selection, description of participants, instrumentation, research procedures, instructional interventions, and data analysis.

Theoretical Framework

Within the dynamical systems theory (DST), the interactions of contextual and dynamical variables that influence motor development are considered (Thelen & Ulrich,
Movement by this theory is seen as a product of many cooperating subsystems that interact with the organism, environment, and the task to produce movement (Thelen & Ulrich, 1991) and influence performance of fundamental motor skills. Organismic characteristics include factors such as age, gender, weight, other genetic factors, and motivation. Task factors could be locomotor or object control skills with defined movement patterns, and the environment has to do with equipment, nature of facilities, and the type of instruction involved. Fundamental motor skills are perceived to result from the interaction of the environment, the organism, and the task (Newell, 1984; Thelen & Ulrich, 1991). The individual is considered as a system comprising of many subsystems. Movement is a product of these subsystems interacting. Changes in movement patterns are therefore a result of factors influencing the system (Newell, 1984; Thelen & Ulrich, 1991).

Dynamic Systems Theory does not only look at the interaction of what brings about changes but also considers factors underlying movement skills (Thelen & Ulrich, 1991). The individual is viewed, as a system comprised of multiple interacting subsystems such as intrinsic and extrinsic motivation, experience, previous knowledge, and ability. The interaction of these subsystems brings about movement patterns and changes in the movement patterns. Given the multiple sub-systems interacting within an individual, no two people are considered alike and thus movement product is unique to each child and each situation.

During the performance of motor skills, the individual may exhibit several possible movement patterns referred to as degrees of freedom. For the performer to
execute the desired movement pattern the individual has to find ways of reducing the degrees of freedom. It is for this reason that when teaching children to acquire specialized movement patterns such as OC skills, degrees of freedom within a task subsystem are reduced so as to offer little variance of movement (Roberton, 1991). The reduction of the degrees of freedom may result in a movement pattern referred to as a dynamical attractor state. Here the cooperating subsystems continue to interact in a certain manner (Thelen & Ulrich, 1991) and the subsystems are driven to produce a more stable movement. This stable movement is the attracter phase, which is initiated by a perturbation, causing the system to move from the old movement pattern to a new, stable, and more efficient movement. The change is referred to as a phase shift (Thelen & Ulrich, 1991).

Individual children have different subsystems interacting during the performance of motor skills. A wide variation of movement patterns can be observed among children because subsystems such as genetics, coordination, experience, strength, and motivation affect individual performance. The subsystems that come into play during the acquisition of OC skills are organismic (learner), task-related, and environmental (Windle & Lerner, 1986). This study will examine the learner variables of gender, and the environmental variable of type of motor skill intervention (direct or mastery) as they relate to the instruction of OC skills.

**Research Design**

This study used a Pretest-Posttest Randomized Groups design (Thomas & Nelson, 1996). This is an experimental design where groups were randomly formed and the groups were given a pretest as well as a posttest. The main purpose of this design was to
determine the amount of change produced by the treatment (Thomas & Nelson, 1996). This design, according to Thomas and Nelson, has a threat to internal validity of testing. However, the threat was controlled for as the comparison of pretest and posttest of the control group included the testing effect as well as the comparison of pretest and posttest in the treatment group. Although testing effects could not be evaluated in this design, it was controlled (Thomas & Nelson, 1996).

Fifty-three participants were randomly assigned to Intervention Groups. Intervention Group 1 had 27 participants, and Intervention Group 2 had 24 participants. A Comparison Group of 26 participants was utilized.

Variables

The independent variable in this study was a nine-week OC motor skill intervention that was administered to two intervention groups. One group used a direct instruction approach and the other used a mastery motivational climate approach. The primary dependent variable was OC skill performance as measured by TGMD-2 (Urich, 2000). Teachers’ feedback and participants’ opportunity to respond were variables that were considered relative to checking for intervention integrity.

Context of the Study

The setting for the study was an urban mid-western city in the United States. Participants were drawn from two different sites within the Head Start Program. The intervention groups were selected from a site in an urban city. The comparison group was chosen from a similar urban Head Start site to avoid intervention contamination effects. Both programs used the same selection criteria to identify children for Head Start.
Children in the Head Start program were from environments, which were categorized as disadvantaged.

Typically, these children come from low-income homes, some live in environments that are unsafe for them to go out to play, and some have family crisis. The selection criteria to be eligible for the program were the same across all sites. Both Head Start sites did not participate in regular physical education programs. Instead, they had daily unstructured gross motor activities either indoors or outdoors and these activities involved activities such as riding bikes, shooting playground balls, throwing bean bags, or playing some form of Tee ball.

Selection of Participants

Two sites in an urban mid-western Head Start program were non-randomly sampled for the study. Head Start programs have been identified as serving urban children considered disadvantaged. The selection criteria for participants were that, they had similar age, low-income backgrounds, and environmental risk factors. Both sites were eligible for the Ohio State Board of Education compensatory program for preschools. Both sites had no structured motor skill programs. They all followed a standardized Head Start curriculum in the program. They also had similar teacher to student ratios. Three preschool classes (A, B, C) from site one provided the children for the Intervention Groups. Sixty-three parental consent forms were sent out to parents, and a total of fifty-one signed forms were returned. The children with signed consent were randomly assigned to one of the two intervention groups. The Comparison Group was also selected from preschool classes (A, B, C) from site two. Thirty-two parental consent
forms were sent out to parents, and twenty-eight signed forms were returned. Just before the intervention took place two participants in the Comparison Group moved to another program site and one did not want to be video taped. The site for the Comparison group closed down before the intervention and children from that site joined the classes at the site where the intervention participants were enrolled and the study took place.

*Intervention Participants*

There were two intervention groups, direct instruction (Intervention Group 1) and mastery motivational climate (Intervention Group 2). Fifty-one children from three classes (A, B, C) in site one, were randomly assigned to either Intervention Group 1 or Intervention Group 2. Due to the size of the gymnasium and safety concerns, it was not possible to teach all children in each group together. Thus, Intervention Group 1 and 2 were subdivided into two instructional subgroups for the purposes of instruction (see Table 3.1 for a summary of assignment of children to group and subgroup).

<table>
<thead>
<tr>
<th>Class</th>
<th>Intervention Group 1</th>
<th>Intervention Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct Instruction</td>
<td>Mastery Motivational Climate</td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>(n=20)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>(n=16)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>(n=15)</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>24</td>
</tr>
</tbody>
</table>

Table 3.1 Summary of Participants Random Assignment to Intervention Groups
Intervention group 1 was the direct instruction group and consisted of 27 children including 9 females and 18 males. The group was comprised of 100% African American children. The mean age was 52.41 months ($SD = 7.13$).

Intervention group 2 was the mastery motivational climate group. It consisted of 24 participants with 9 females and 15 males. The group comprised of 100% African American children. The mean age was 49.6 months ($SD = 8.12$).

Comparison Group

The participants for the Comparison group were 26 children randomly selected from three classes in site two. There were 7 females and 19 males. The group comprised of 1 African, 19 African American, 4 Hispanic, and 2 White children. The mean age was 50.4 months ($SD = 6.54$).

Instrumentation

The dependent variable for the study was OC motor skill performance as measured by the Test of Gross Motor Development (TGMD-2) by Ulrich (2000). All lessons were video taped and coded. Target participants’ OTR and facilitator feedback were tallied and data were used for an integrity check for the study.

*The Test of Gross Motor Development-2*

The Test of Gross Motor Development 2 (TGMD-2) is a well-constructed, criterion-referenced and norm-referenced, standardized test of gross motor skill development that includes locomotor and OC skills. The TGMD-2 measures how children coordinate their trunk and limbs during movement task performance in fundamental motor skills rather than assessing end results (Ulrich, 2000). The TGMD-2
is used to (a) identify children significantly behind their peers, (b) assess individual progress in gross motor skill development, (c) plan instructional progress in gross motor skill development, and (d) evaluate the success of a gross motor program.

The TGMD-2 has two subscales; OC skills and locomotor skills. For the purposes of this study, only the OC subscale was used. The OC subtest is made up of six object control skills: striking a stationary ball, stationary dribble, catch, kick, overhead throw, and underhand roll.

The TGMD-2 identifies performance criteria for each skill that are to be demonstrated by the participant. The total possible raw score for the OC subscale is 0 to 48 points. For OC skills, the points awarded to the various skills are as follows: throw 8 points, bounce 8 points, strike 10 points, catch 6 points, kick 8 points, and roll 8 points. When a participant demonstrates the performance criteria correctly, one point was awarded to the element on the assessment form. Participants had to perform two trials for each skill. Both trials were assessed and points were recorded accordingly. At the end of the test, the primary researcher totaled the scores of the two trials for each skill and assigned a raw score total.

A high score indicates the participants’ skills are well developed, whereas lower scores indicate absence of the criterion elements listed for the skill. Raw scores were converted into percentile ranks and standardized scores using tables that consider age and gender. Ranks between the 25th and 75th percentile indicated average performance (Ulrich, 2000). Below the 25th percentile indicated a low score and implies there was a
developmental delay in skill performance, whereas above the 75th percentile indicated a high score and advanced development of skills (Ulrich, 2000).

To effectively use TGMD-2 the following considerations suggested by Ulrich (2000) were followed.

1. The primary researcher taught and developed competence in those who assisted with the data collection. The primary researcher has several experiences in utilizing the instrument so supervised practice was given to the research assistants to ensure adherence to test procedures.

2. Testing conditions were followed. There was prior arrangement of the setting to help minimize administration time and distractions. Materials were put at various designated spots and participants were checked for appropriate shoes and safety.

3. Testing time was 12-20 minutes for each participant. To ensure the test was completed within the time frame, several balls were provided during the test to reduce time for retrieving balls.

4. Appropriate information was provided on the examiner record form for identification of participants. There was accurate demonstration preceding assessment. Participants had a practice trial to ensure that they knew what they were expected to do and a second demonstration was performed if a child did not understand after the first one. Each participant had two trials for each OC skill tested and the score for each trail was recorded.
Feedback Instrument (FI)

The feedback instrument is an event-recording instrument adapted from Rink (1998). The instrument was used in coding, positive, negative, general, specific, corrective, and evaluative feedback. Additionally, modeling and manual manipulation were provided as deemed warranted. Positive feedback refers to “praise that follows a skill attempt and could be general or specific in nature” (Darst, Zakrajsek, & Mancini, 1989). Negative feedback referred to scolding that follows a skill attempt, and could be general or specific in nature” (Darst et al., 1989). General feedback statements “provide the learner with information that clarifies the intent of performance” for example, good job, and specific feedback conveys specific information to the learner on performance, for example, good job you stepped with the opposing foot before kicking (Darst et al., 1989). Corrective feedback is “that which gives the learner information on what to do or not to do in a future performance”, for example, next time step with the opposing foot (Darst et al., 1989). Evaluative feedback makes “judgment about a past performance for example, good rotation of the hip” (Darst et al., 1989).

Modeling is any antecedent stimulus that is topographically identical to the behavior the teacher wants imitated (Cooper, Heron, & Heward, 1987). For example, a teacher may ask a child having problems performing the skill of throwing to stop and observe the way the teacher or another person does it so the child could imitate. Manual manipulation is the physical guidance of the body to assist the child with the proper idea of what is to be done (Siedentop, Herkowitz, & Rink, 1984). For example, a teacher may physically hold a child’s leg to move a step forward, hold the throwing arm and extend it to the back
then ask the child to perform. The frequency of the feedback, were tallied and the totals and percentages for each group were computed at the end of the lesson (Appendix I).

**Opportunity to Respond (OTR)**

The instrument was an event-recording instrument (Darst, Zakrajsek, & Mancini, 1989). (Appendix H). It was used in coding the OTR of target participants, which included the number of trials an individual performed during a given task. The instrument had two columns. The first column was used to tally participants’ correct trials and the second column was checked for the number of incorrect trials participants performed.

A correct trial is when the participant performed a given task appropriately, whereas an incorrect trial was when the participant’s performance did not meet the criteria for the task. For example, in a catching task, participants were supposed to bend their elbow with palms slightly apart and facing. Participants were to catch the ball with the hands and draw the ball towards the chest. Any trial that did not meet the required criteria for this task was coded incorrect performance. Total trials, rate of trials per minute, the task being performed, and the stage of performance were all recorded on the instrument. The total OTR were calculated with the corresponding tasks and time of participants for analysis (Siedentop & Tannehill, 2000).

**Development and Implementation of the Intervention**

Two instructional OC skill interventions were administered as part of this study; one a direct instruction approach and the other a mastery motivational climate. A direct instructional approach was used to teach OC skills to Intervention Group 1. This approach has been validated by physical education pedagogy experts and has been

A mastery motivational climate approach was used in teaching OC skills to Intervention Group 2. This is an approach that has been adopted from the TARGET model proposed by Ames (1992) and was adapted and used by Valentini and Rudisill, (2004).

*Similarities in the Intervention*

The intervention groups used the same lesson plans developed by the primary researcher. The series of tasks selected for instruction and the feedback statements provided to participants were the same in both intervention groups. All lessons lasted for 30 minutes each session and there were two instructional sessions per week for 9-weeks resulting in a total of 540 minutes (9 hours) of instruction. There were two OC skills stations provided during every intervention session. The same two instructors/facilitators assisted with the instruction of the interventions throughout the 9-week intervention. Participants from both intervention groups were taught in the same facilities and with the same equipment.

*Differences Between the Interventions*

*Intervention Group 1* (Direct Instruction) the intervention was conducted twice per week for 30 minutes for 9 weeks. Classes started with a 6-minute warm-up session led by the primary researcher. The children then rotated to two, 12-minute skill stations. The skills taught each session are identified in Table 3.2
After warm up, participants were randomly divided into two groups and each group was assigned to a station. Participants were randomly assigned to groups during all intervention sessions to prevent group effects.

Each station had one facilitator and seven participants. Participants rotated through the two OC skills stations during each intervention session.

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Strike</th>
<th>Roll</th>
<th>Dribble</th>
<th>Throw</th>
<th>Catch</th>
<th>Kick</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td></td>
<td>12</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td></td>
<td></td>
<td>12</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td></td>
<td></td>
<td>12</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>6.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>6.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>7.1</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>8.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>9.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

Table 3.2: Allotment of Instructional Time for OCS in Direct Instruction

They spent 12 minutes at each station. On the first day, the stations were striking and dribbling. After the first 12 minutes, participants were instructed to stop and move to the other station. Participants moved as a group to the next station. Each participant had
the opportunity to practice both skills. For example, after the warm up session John went to his first station, which was striking and after 12 minutes, John moved to the dribbling station and spent the next 12 minutes there.

The primary researcher was responsible for timing the sessions and supervising transition from station to station. The facilitator at each station was responsible for introducing activities by providing clear directions on the task or activities to be performed as written in the lesson plan. Facilitators modeled for the children to see the task they were to perform. Facilitators were also responsible for providing children with cues and feedback that had been identified in the lesson plan. Facilitators positively reinforced the children when they performed tasks correctly and consistently after the introduction of the task.

Lessons were video taped and at the end of each day’s lesson, there was a post-session observation and coding of the tapes. Notes were taken on relevant issues that came up during the intervention and were used to provide more insight into the study. Participants’ response to instruction, interaction of participants and facilitators, the interactions between the primary researcher and the other facilitator were discussed. Changes that occurred were noted and reported. Facilitator’s feedback and target participants’ OTR at each station were coded and used for an integrity check.

*Intervention Group 2 (Mastery Motivational Climate)* - This approach aimed at creating a mastery motivational climate where students had the freedom to choose activities and have some control over what they learned and for how long in class. They were involved in monitoring and evaluating their own performance (Ames, 1992). The
model uses the acronym TARGET to refer to the following structures: Task, Authority, Recognition, Grouping, Evaluation and Time as the focus areas for implementing the strategy.

The TARGET structures included the following arrangement:

**Task** - A variety of tasks that were challenging and at the same time motivating enough so that children can set realistic goals and work towards meeting them.

**Authority** - The authority in the model allowed children to participate in decision making and being responsible for their learning. Children were able to select the tasks and skills they preferred.

**Recognition** - Recognition dealt with acknowledging individual participation and the progress made, and also giving equal opportunities and rewards for everyone.

**Grouping** - Children were given the freedom to make choices about those they wanted to be with in the various stations during instruction. Intact groups were not set, thus children floated in and out of working with different classmates.

**Evaluation** - Children were involved in the evaluation process. In this approach, they were assisted with doing self-evaluations. Children were monitored and provided with evaluative feedback to help them with the self-evaluation.

**Time** - The model allowed for flexibility in the use of time, children were provided with opportunities to work at their own pace and given time for improvement.

In the mastery motivational climate approach both teachers and students shared responsibilities for making choices, giving directions, monitoring work, enforcing rules, offering rewards, and evaluation of success (Ames, 1992; Valentini, Rudisill, &
Goodway, 1999; Valentini & Rudisill, 2004). Table 3.3 gives a description of how the model was used during the intervention.

The intervention was conducted twice per week for 30 minutes for 9 weeks. There were two classes per week each lasting 30 minutes. Classes started with a 6-minute warm-up session led by the primary researcher.

<table>
<thead>
<tr>
<th>Target Area Descriptions</th>
<th>Strategies</th>
</tr>
</thead>
</table>
| Task                     | • A variety of OCS activities were presented at the stations  
                           • Tasks ranged from easy to hard  
                           • Facilitators prompted children to perform tasks appropriately |
| Authority                | • Children decided what tasks they wanted to perform  
                           • Facilitators prompted children to perform task appropriately |
| Recognition              | • Facilitators provided children with feedback as they performed.  
                           • Facilitators helped children understand the objectives of the tasks so children called facilitators to observe them if they were performing correctly. They were rewarded with stickers. |
| Grouping                 | • Children worked with different people at the various stations because individuals decide where to go and what task to perform |
| Evaluation               | • Facilitators discussed children’s performance with them and give them feedback and stickers that motivated them to work and improve |
| Time                     | • Children worked at their own pace, and facilitators provided them with the necessary individual support as they worked on tasks. |

Table 3.3 TARGET as used for Intervention

There were always two stations with a variety of equipment and tasks set up for each class. After opening activities, the children chose the stations and activities they wanted to perform, and equipment they preferred to use at the various stations. For example, after the initial warm up Jane decided to spend 5 minutes at the striking station,
then moved to the dribbling station, tried two different activities for 7 minutes, moved back to the striking station, and spent 8 minutes on three different tasks. From there she went to the dribbling station, and spent 4 minutes on two tasks at the rolling station. At the end of the session, Jane spent 24 minutes but the time she spent at the various stations varied.

The allocation of skills to each session was identical to Intervention Group 1 and can be found in Table 3.2. The only difference was that each child chose which skill and activities to perform, thus instructional time at each skill varied for each child. In order to control for safety issues such as too many children at the various stations, 10 clothes pegs were placed at each station. The pegs were in different colors for each station. Children had to clip one peg onto their clothes while they worked at the station. When they had to leave for another station, they left the peg at the station. A child had to make sure there was a vacant peg at the next station he/she wanted to go to before they could move to that station. This controlled for overcrowding at the stations because pegs represented the amount of space available for children to safely participate at the station.

During the intervention, participants in the group had the freedom to choose from among a variety of activities at the stations. Participants were allowed to try any of the OC skills they were interested in doing during the lesson. There was one facilitator at each station who was responsible for introducing activities and modeling for the children. Facilitators also provided children with evaluative feedback and helped participants monitor their success. Participants were to draw the facilitators’ attention to observe them when they thought they were performing the task correctly. Participants received stickers
when they performed tasks correctly. Lessons were video taped and at the end of each
day’s lesson, there was a post-session observation and coding of the tapes.

Facilitators’ feedback to target participants and target participant’s OTR were
coded and used for an intervention integrity check.

Procedures

The goal of the study was to compare two instructional approaches in teaching OC
skills. After the Pre-test, but prior to the intervention, lesson plans were developed using
a developmental task analysis approach for each OC skill considering the developmental
level of the participants. Instructional task analyses (Appendix D), instructional cues
(Appendix E), and lesson plans (Appendix C) were evaluated by pedagogy and motor
development experts to determine their suitability for the intervention.

Two graduate students, who had taken a Lifespan Motor development course,
were trained as facilitators to assist with the interventions. The primary researcher
developed a training manual (Appendix G). The training included review of stages in
fundamental motor skills, Test of Gross Motor Development (TGMD-2), and task
analyses and feedback. Training tapes were developed from the tasks in the lesson plans.
Both the primary researcher and facilitators used the tapes during the training sessions to
generate an acceptable accuracy of 85% and above in identifying developmental stages
and providing appropriate instructional cues. Two graduate students were trained to code
TGMD-2, facilitators’ feedback and participants’ opportunity to respond.

Pre and post-intervention OC skills performances data were collected from the
participants in the two intervention groups and the comparison group using the TGMD-2
OC subscale. Three graduate students who had taken a graduate motor development course and were trained in the administration of the TGMD-2 assisted with the collection and coding of these data. Pre intervention data were collected in January 2006 and post intervention data was collected the week after the 9-week intervention program in March 2006.

**Intervention Integrity**

To ensure that the interventions were implemented as intended, intervention integrity protocol and worksheet (Appendix F) was used to assess intervention integrity. Immediately after the lesson had been taught, the integrity worksheet was used to get feedback on the performance of the facilitators and the implementation of the lessons relative to the intent of the intervention. A graduate student with experience in supervision of student teachers was trained to be responsible for completing the intervention integrity work sheet once every other week.

Integrity checks were conducted for weeks 1, 3, 5, 7, and 9 for both Intervention Group 1 and Intervention Group 2. Videotapes of lessons were viewed and coded using the integrity worksheet. The accuracy rating for direct instruction was 100% through out the intervention. The accuracy for mastery motivational climate was 100% for weeks 1, 5, and 9. However in weeks 3 and 7 the accuracy rating was 96% .The rating of the integrity of the intervention was high and so the need to retrain facilitators did not arise. The integrity information helped the primary researcher ensure that the intervention was being delivered in the manner intended and that the treatment received by participants in each group was appropriate to the intent of the study.
To further ensure intervention integrity and examine the nature of each intervention, two high skilled participants (male and female) and two low skilled participants (male and female) were identified from Intervention Groups 1 and 2. Participants with the highest and lowest percentile scores on TGMD-2 at pre-intervention were chosen and tracked throughout the intervention. The OTR of these participants were coded and analyzed to demonstrate and explain participants’ responses in the two different intervention environments.

Participants’ OTR were coded for all skills once at the beginning of the intervention and at the latter part of the intervention. These data showed that highly skilled participants both females and males in both intervention groups performed tasks correctly more than 55% of the time they spent at a station regardless of the skill at the initial part of the intervention. The low skill participants had correct trials between 35% and 40% at the beginning of the intervention.

This information was helpful to the primary researcher because the objective of the integrity check was to make sure that participants in both intervention groups had the same chances to learn the skill without any advantage of one group over the other in teaching the lessons as planned. These data collected at the later part of the intervention indicated that high skill females and males in both intervention groups performed correct trials 70% of the time. It was observed that the high skill males in the mastery motivational climate had more trials on all OC skills than the high skill male in direct instruction but the correct trial performance was the same. These data showed that low skill females performed correct trials 52% of the time in both intervention groups.
Facilitators’ feedback to the target students were coded and analyzed to determine whether participants in both intervention groups received similar or different types of feedback. The same intervention sessions that were used for OTR were used for facilitators’ feedback. Data on facilitators’ feedback at initial stage of the intervention showed that on the average, facilitator A provided 15% positive feedback, 0% negative feedback, 10% general feedback, 15% specific feedback, 40% corrective feedback, 10% evaluative feedback, 10% modeling, and 10% manual manipulation. These feedbacks were given to participants in both intervention groups. Facilitator B on the average provided 10% positive feedback, 0% negative feedback, 25% general feedback, 5% specific feedback, 35% corrective feedback, 10% evaluative feedback, 15% modeling, and 10% manual manipulation. Feedback was provided to participants in both intervention groups.

These data indicated that both facilitators provided corrective feedback using the cues in the lesson plans. Both facilitators used modeling and manual manipulation in providing feedback to low skill participants in both intervention groups. None of the high skilled female or male participants were provided with manual manipulation. Also none of the participants received any negative feedback from any of the facilitators in either of intervention groups.

Facilitators used the information from the initial data to improve upon the feedback they provided participants. After reviewing these data, facilitators saw that there was the need to provide more corrective and evaluative feedback to participants and to cut down on general feedback. Facilitators saw the need to call children by name when
providing feedback. Data collected at the later part of the intervention showed that both facilitators provided mostly specific, corrective, and evaluative feedback. There were a few times when modeling was used but manual manipulation was not use. Facilitator (A) on the average provided, 5% positive feedback, 0% negative feedback, 0% general feedback, 30% specific feedback, 40% corrective feedback, 20% evaluative feedback, 5% modeling, 0% manual manipulation. Facilitator (B) on the average provided 10% positive feedback, 0% negative feedback, 5% general feedback, 25% specific feedback, 35% corrective feedback, 20% evaluative feedback, 5% modeling, and 0% manual manipulation. These data showed that facilitators provided feedback to participants in both intervention groups regardless of skill level or gender.

Comparison Condition

The participants in the Comparison Group were involved in the general Head Start program. They continued to take part in the regular Head Start routine that included daily outdoor play when weather permitted. When the weather did not permit the children to go outside they were engaged in large muscle activities at the center. The activities involved playing on large playground structures and riding various riding toys.

Rationale for Selection of Statistical Procedures

Normal distribution is a critical concept in the use of parametric statistics and the assumption is that, unless groups are randomly assigned, normal distribution will not be evidenced (Hopkins, Hopkins, & Glass, 1996; Thomas & Nelson, 1996; Vincent, 1999). Importantly therefore in this study, participants were randomly assigned to the intervention and comparison groups. The two groups of participants were taught in two
different environments. According to Vincent (1999), another assumption of parametric statistics is that the scores in each group are independent. That is, the scores are not dependent on, not correlated with, or not taken from the same participants as scores in any other group. In Intervention Group 1 (direct instruction), instruction was provided to the group and it could be argued that there is not independence of treatment effects. However, from a dynamic systems perspective it can be countered that each child is unique bringing to the instructional environment unique characteristics and experiences.

Additionally, during direct instruction, instructional cues and tasks were modified to the observed developmental level of each child. Thus, there was independence of treatment effects. In Intervention Group 2 (mastery climate), each child moved through the intervention at his/her own pace and self selected skills and activities of their choice. Thus, no child engaged in the intervention in the same manner resulting in independence of treatment effects. Thus, parametric statistics were deemed appropriate to use where necessary to answer the research questions.
Data Analysis

Table 3.4 shows the summary of research questions and the methods used in the
data analysis.

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Overall Analyses</th>
<th>Method of Analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Pre-intervention developmental levels</td>
<td>Descriptive Statistics</td>
<td>Means and Standard Deviations of Raw OCS Scores % Ranks</td>
</tr>
<tr>
<td>Q2. Pre OCS Group Differences</td>
<td>A 3 GROUP X 2 GENDER ANOVA on OCS Raw Scores</td>
<td>Examine GROUP Main Effect If significant – Post hoc Tukey analyses</td>
</tr>
<tr>
<td>Q3. Pre OCS Gender Differences</td>
<td></td>
<td>Examine GENDER Main Effect If significant – Post Hoc ANOVA</td>
</tr>
<tr>
<td>Q 4. Gender differences within individual Groups</td>
<td></td>
<td>Examine GROUP X GENDER Interaction If significant – Post hoc analysis</td>
</tr>
<tr>
<td>Q5. Pre-to-Post differences in OCS among Groups</td>
<td>A 3 GROUP X 2 TIME X 2 GENDER ANOVA with Repeated Measures</td>
<td>Examine GROUP X TIME Interaction If significant GROUP X TIME Interaction - Post hoc paired sample t-test</td>
</tr>
<tr>
<td>Q6. Pre-to-Post OCS differences within each individual Group</td>
<td></td>
<td>Examine GENDER X time Interaction If significant - Post hoc ANOVA analyses</td>
</tr>
<tr>
<td>Q7. Gender differences from Pre to Post intervention</td>
<td></td>
<td>Examine GROUP X TIME X GENDER Interaction If significant- Post hoc analyses</td>
</tr>
<tr>
<td>Q8. Gender differences within each group</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.4 DataAnalyses Chart
CHAPTER 4

RESULTS

The following research questions guided this study.

Pretest Group Research Questions

1. What are the developmental levels of pre-intervention OC skills performance in Intervention Group 1, Intervention Group 2, and the Comparison Group?

Results for Research Question 1

Table 4.1 shows the pre and post intervention raw scores of the object control subscale and the equivalent percentile ranks for Intervention Group 1, Group 2, and the Comparison Group. Descriptive statistics showed the means for the raw score as 20.30 for Intervention Group 1, 19.59 for Intervention Group 2, and 19.31 for the Comparison Group. The raw scores translated into percentile ranks indicated that participants were at average performance levels before the intervention. The percentile ranks were 34% for Intervention Group 1, 36% for Intervention Group 2, and 31% for the Comparison Group.
<table>
<thead>
<tr>
<th></th>
<th>Intervention Group 1</th>
<th>Intervention Group 2</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (n=27)</td>
<td>Mean (n=24)</td>
<td>Mean (n=26)</td>
</tr>
<tr>
<td>OC Raw</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Female</td>
<td>16.33</td>
<td>32.78</td>
<td>4.84</td>
</tr>
<tr>
<td>Male</td>
<td>22.28</td>
<td>38.61</td>
<td>5.20</td>
</tr>
<tr>
<td>OC %</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Female</td>
<td>29.33</td>
<td>86.00</td>
<td>21.39</td>
</tr>
<tr>
<td>Male</td>
<td>37.11</td>
<td>88.39</td>
<td>18.92</td>
</tr>
<tr>
<td>Total</td>
<td>34.52</td>
<td>87.59</td>
<td>19.72</td>
</tr>
</tbody>
</table>

Table 4.1 Pre and post raw scores and percentiles of Intervention Group 1 and 2 and the Comparison Group.
2. Were there any differences in OCS performance between Intervention Group 1, Intervention Group 2, and the Comparison Group at pre-intervention?

A 3 Group (Intervention 1, Intervention 2, Comparison) X 2 Gender (Girls, Boys) ANOVA on pre-test object control raw scores was used to answer research questions 2-4. The specific analysis needed to answer the question will be discussed under each question.

Results for Research Question 2

The analysis of interest was the Group main effect. A non-significant Group effect ($F, [2, 71] = 46, p = .63$) was found indicating that there were no group differences in the OCS performances of the participants prior to the intervention.

Pretest Gender Research Question

3. Were there gender differences in pre-intervention OCS performance?

Results of Question 3

The analysis of interest was a Gender main effect. The analysis indicated that there was a significant gender effect ($F, [1, 71] = 13.18, p = .001$). This showed that boys performance levels at the pre-intervention were significantly higher than girls. Because there was a significant gender effect, it was necessary that the Group X Gender interaction be examined as indicated in Research Question 4, to see if the gender differences were the same in all of the groups.
4. Were there gender differences within Intervention Group 1, Intervention Group 2 and the Comparison Group?

Results for Question 4

The analysis of interest was a Group X Gender interaction in order to examine if gender differences were the same for all groups. The analysis indicated that there was not a significant Group X Gender interaction ($F, [2, 71] = 1.16, p = .318$). This shows that the differences in gender were the same within Intervention Group 1, Intervention Group 2 and the Comparison Group before the intervention.

In summary, prior to the intervention, there were no differences among groups however, except that boys outperformed girls in OC skills within groups.

Influence of the Intervention on Object Control Performance by Group

A 3 Group (Intervention Group 1, 2; Comparison) X 2 Time (Pre-Post-Intervention) X 2 Gender (Boys, Girls) ANOVA with repeated measures on the last factor (OC raw scores) was used to answer Research Questions 5-8. The specific analysis to answer the relevant question will be discussed under each question.

5. Were there any differences in pre-intervention to post-intervention OCS performance between Intervention Group 1, Intervention Group 2, and the Comparison Group?

Results of Question 5

The analysis of interest was the Group X Time interaction. A significant Group X Time interaction was found ($F [2, 71] = 69.92, p < .0001, \eta^2 = .66$) indicating that the groups differed from pre-to post-intervention.
Post-hoc Tukey HSD tests revealed that Intervention Group 1 was significantly better than the Comparison Group ($p < .001$) from pre to post-intervention. Also, that Intervention Group 2 was significantly better than the Comparison Group ($p < .001$) from pre-to-post-intervention. There were no significant differences between Intervention Group 1 and Group 2 ($p = .99$).

The raw score means for Intervention Group 1 moved from 16.33 to 32.78 and the percentile ranks moved from the 34th to the 87th percentile. Intervention Group 2 raw score went from 19.59 to 37.13 with an equivalent percentile from the 34th to 90th percentile. The Comparison group went from 19.31 to 19.81 at post-intervention with the percentile rank going from the 35th percentile to 33rd percentile at post-intervention. The explanation for why the percentile rank decreased in the Comparison Group is due to the fact that some of the children moved age categories from pre to post-intervention resulting in lower percentile ranks.

6. Were there pre to post-intervention differences in the OC skill performance within Intervention Group 1, and 2, and the Comparison Group?

Results of Question 6

This question examined whether each group significantly improved their performance from pre-to-post-intervention. The statistic of interest was a significant Time main effect. The results showed that there was a significant Time effect ($F[1, 71] = 323.45, p < .0001, \eta^2 = .820$) indicating that overall, groups improved from pre to post-intervention. Since the Time effect was significant, follow up post-hoc tests were conducted. Three follow up paired sample $t$-tests revealed that both Intervention Group
1 ($t [26] = -13.76, p < .001 [2-tailed]) and Intervention Group 2 ($t [23] = -13.41, p < .001 [2-tailed]) significantly improved from pre to post intervention. In contrast, the Comparison Group did not improve from pre to post-intervention ($t [25] = -1.40, p = .173 [2-tailed]). In summary, both intervention groups significantly improved their OC skills performance over the intervention in contrast to the Comparison group whose performance stayed the same.

7. Were there gender differences from pre-to-post intervention OC skills performance?

Results for Question 7

The analysis of interest was a significant Gender X Time interaction. The results indicated that there was not a significant Time X Gender interaction effect ($F [1, 71] = 1.701, p = .196, \eta^2 = .023$). These results suggest that there were no gender differences in pre to post-intervention OC skills performance.

8. Were there Group by Gender differences from pre-intervention to post-intervention within Intervention Group 1, or Intervention Group 2, or the Comparison Group?

Results for Question 8

The analysis of interest was a Group X Time X Gender interaction effect. The results revealed that there was not a significant Group X Time X Gender interaction ($F [2, 71] = 2.16, p = .12, \eta^2 = .06$) indicating that boys and girls did not differ by group from pre-to post-intervention. As this interaction was not significant, no follow up tests were warranted.
CHAPTER 5

DISCUSSIONS/IMPLICATIONS/RECOMMENDATIONS

This chapter discusses the results of the influence of two instructional approaches in physical education, direct instruction and mastery motivational climate, on the acquisition of object control (OC) skills of preschool children in a Franklin County Head Start program. Objectives of the study were to determine: (a) the developmental level of OC skill performance of children at pre-intervention; (b) the influence of gender on pre-intervention OC skill performance; (c) the influence of the different interventions on OC skill acquisition; and (d) the interaction of gender and intervention on OC skill performance from pre to post intervention. The implications of the results and suggestions for future research for each research question are addressed.

The Object Control Skills Performance of Young Children who are Disadvantaged

Before the intervention was implemented, the pre-intervention data gathered indicated that OC skill levels of participants were on the low side of average development. Ulrich (2001) suggests that children who have average motor skill development fall within the 25th to 75th percentile rank of performance. In this study, Intervention Group 1 performed
at the 35th percentile, Intervention Group 2 at the 36th percentile, and the Comparison Group at the 32nd percentile. The results from this study were somewhat surprising as previous studies have indicated that preschool children considered disadvantaged performed OC skills at levels considered developmentally delayed (Connor-Kuntz & Dummer, 1996; Goodway & Rudisill, 1997; Hamilton, Goodway, & Haubenstriker, 1999; Savage, 2002). It is not clear why these children performed OC skills at somewhat higher levels. However, the children in this study had participated in an activity project the previous year. The children’s teachers reported learning about motor skills from that project, and being motivated to continue to promote motor skills in their children was very encouraging, especially given the concerns about childhood obesity being expressed in the community. This prior experience may explain the somewhat higher (low average) percentile ranks. Despite this, although higher than other studies, the OC skill percentiles reported in this study were still somewhat low and were on the lower end of average development.

It was not within the scope of this study to examine why the children performed motor skills at the level they did on pretest pre-test measures. However, anecdotal evidence from teachers, children, and parents suggested that the children were not being raised in environments that provided opportunities to practice and apply their motor skills. It may be that environmental constraints in the children’s environments such as lack of places to play and limited opportunities to practice may have influenced the development of OC skills.
From a DST perspective, the environment is one of the constraints that act to influence motor development (Newell, 1984). It seems that the children’s environment was not supportive of OC skills development as such this was reflected in the pre-intervention measures of their performance. Studies by Branta and Goodway (1996) and Goodway and Smith (2005) have supported the notion that children who are disadvantaged typically do not have supportive environments for FMS development and further research needs to examine the role that environments play in the development of motor skills.

One of the strengths of this study is that there were not significant differences found in pretest performance levels among Intervention Group 1, Intervention Group 2, and the Comparison Group which indicates homogeneity across these randomly formed groups prior to the interventions. This may be for a couple of reasons. The research design involved non-random selection and random assignment of participants to groups, thus increasing the chances that groups would be similar prior to intervention (Thomas & Nelson, 1996). Additionally, all children were selected from a Head Start program that had the same selection criteria for entry into the program. The combination of the selection criteria for Head Start and the random assignment strengthened the design of the study and resulted in all groups being statistically similar prior to the intervention.

Implications of the Object Control Skills Performance of Young Children Who are Disadvantaged

The research literature has documented that young children who are disadvantaged typically have limited places to play at home and minimal physical education in schools
(Branta & Goodway, 1996; Goodway & Smith, 2005). Given that many of these children started the intervention with low-to-average motor skills, concern may be expressed about the future developmental trajectories of their OC skills (Branta & Goodway, 1996; Goodway & Branta, 2003; Goodway & Smith, 2005). It is most likely that the performance of OC skills in these young children would only decline due to the limited opportunities to practice these skills and gain feedback and instruction. Thus, educators, parents, and administrators should be concerned about where these children are developmentally and the influence of this development on future physical activity patterns.

Seefeldt (1980) suggested early childhood is the best time for children to learn FMS if they are to break through the proficiency barrier. Seefeldt (1983) is of the view that children need to achieve a certain level of competency in FMS in order to break through the low proficiency barrier and apply FMS to sports, games, and lifetime activities. Thus, starting with lower FMS places the child at greater risk to achieving proficiency in his/her FMS and being able to apply these skills to later life. The low FMS at preschool may be attributed to limited places and resources to play and develop skills and also poor or non-existent PE programs. If the children do not have opportunities to learn FMS then they probably will not break through the proficiency barrier which places them at risk for low physical activity and adverse health consequences (USDHHS, 1996).

Future research needs to track these children and other youth at disadvantage longitudinally to examine the influence of such skill development on long-term physical activity patterns. From a pragmatic perspective, teachers and policy makers of Head Start
preschool programs need to be aware of the developmental status of young children’s motor skill development in order to best meet their needs. Information regarding early motor skill practices, and recommendation such as those of Active Start, need to be incorporated into all Head Start programs (NASPE, 2002). African Americans have higher rates of physical inactivity and obesity as adolescents (USDHHS, 1995, 1996) so the educational community ought to tackle this problem early so as to get these children to begin to lead an active lifestyle as a child with the hopes that they can transfer these skills into their adult life. For example, teachers and administrators need to be aware of the need for these children to learn FMS at the preschool level especially those who are vulnerable because of the environmental risks they face.

*Contextual Observations*

Almost all the children in this study were African Americans. During the intervention it was observed within both intervention groups that, male participants liked to be around the White male facilitator most of the time. Children would hug, pull his hair, touch his beard, and asked him questions about his family, his car, and other things not related to the tasks being performed. A probe into these children’s background revealed that most of them did not have a male father figure in their lives, and it was also observed that all the preschool teachers were females. The intervention gave opportunity for these children to interact with a male adult in authority and the children seemed to enjoy this opportunity to interact with him.
Gender Differences in Object Control Skills

The motor development literature supports the notion that male children typically perform some FMS better than female children, specifically OC skills (Halverson et al., 1982; Seefeldt & Haubenstricker, 1982; Haubenstricker et al., 1983; Thomas & French, 1985). The pre-intervention data of this study revealed that the male children’s performances in OC skills were significantly higher than the female children. Female children performed their OC skills at the 24th percentile whereas the male children performed at the 37th percentile. These findings are in line with previous literature (Halverson, et al., 1982; Seefeldt & Haubenstricker, 1982; Haubenstricker et al., 1983; Thomas & French, 1985).

From a DST perspective, gender is clearly an organismic variable that needs to be considered in any study involving OC skills. Variables such as social role modeling and the environment may influence the type of activity in which the child engages (Payne & Isaacs, 2005). Research on gender and physical activity also indicates that males receive more parental support and encouragement to perform physical activity than females (Brustad, 1993; Seefeldt & Ewing, 1997). Future research should examine the role that underlying biological factors and environmental factors play in the development of gender differences. These data have implications to any individual planning physical activities with young children.

Implications of Gender Differences in Object Control Skills

The significant gender differences reported in the OC skill development of young children have implications to teachers, coaches, and teacher educators. Gender
differences in children need to be addressed to make physical activity enjoyable for all children. Physical education teachers need to recognize these gender differences, account for them during the planning process, and try to remediate them during instruction. Developmentally appropriate practice (COPE, 1992) suggests that teachers accommodate the individual levels of each child into the instructional activities developed. The challenge for teachers then, is to develop an array of instructional tasks that allow the lowest skilled girl and the highest skilled boy to engage successfully in physical activities. Often teachers plan games that involve OC skills without any thought of whether the children have the requisite skills to be successful. Teachers need to consider studies like this one and the implications to instruction so as to be able to teach FMS effectively. It is the responsibility of teachers to ensure females are given the necessary motivation and appropriate instruction to help them develop their OC skills and begin to catch up to their male counterparts. Teacher educators also need to be aware of the gender differences in young children. In many states such as Ohio, teacher licensure in physical education is P-12 that is starting at preschool. Teacher educators need to alert pre-service teachers to the developmental literature and ensure they know how to plan appropriately to meet the developmental needs of young boys and girls.

The results of OC skills testing showed that, significant gender differences that were found at pre-intervention and the differences were still present after the intervention. The female children in the study did not catch up with the male children even though the interventions improved the OC skills of all the participants in the Intervention Groups. In Intervention Group 1, female children moved from 29th to the 86th percentile, while the
male children moved from the 37th to the 88th percentile; in Intervention Group 2, female children moved from the 32nd to the 86th percentile, the male children moved from the 38th to the 93rd percentile, and in the Comparison Group the female children moved from 24th to the 25th percentile, but the male children were still at the 36th percentile at post intervention.

This study is in contrast with the findings of Savage (2002) who found that girls caught up with boys in OC skills after an 8-week performance. For this current study, lessons were planned to meet the needs of all participants considering their abilities and environmental constraint. It was observed that the attitudes of girls and boys towards the tasks varied. Even though participants were put into groups at the OC skills stations, the facilitators gave them individual attention. For example, during the intervention for the first 3 sessions, a low skill girl continued to strike a 6 inch foam ball most of the time while most of the members in her group were striking smaller balls. The facilitator saw that this girl was having success with the bigger ball so she was encouraged to try striking a smaller but showed frustration as she continued to miss the smaller ball and her OTR reduced. Similarly, a high skilled boy in the mastery motivational climate group used a regular basketball while most of the members of his group used playground balls that were lighter and gave them more success. It was also observed that 90% of the time the high skill girls and boys practiced tasks that were classified to be on the high level of difficulty. They found these tasks challenging and somehow interesting. A high skilled boy once requested an actual baseball for striking. When asked why? He replied he thinks he can now play baseball. On the other hand, a low skilled boy enjoyed striking a 6 inch
form ball but he would not try striking a 4 inch ball when he was asked to try striking a smaller ball.

The girls usually liked the attention the facilitators gave them. When they realized that were being observed their OTR increased, otherwise they worked at a slow pace and spent time retrieving and arranging equipment. Boys in the study on the other hand, were very competitive and ambitious as they took chances at more difficult tasks even though they did not always perform them correctly and so, on the average the boys had more OTR than girls. The girls stayed with those tasks were that were giving them success. It was observed that most of the girls were attracted to tasks that had equipment with their favorite colors in both Intervention Groups and purple seemed to be the girls’ favorite color.

This researcher is of the view the that the differences in the choice of tasks participants’ performed and their attitudes towards these tasks were reflected in the pre-to post intervention data. It is therefore necessary that teachers plan lessons to promote fun and positive attitudes (Thomas et al., 1988). It was noted that the color of equipment and the use of a variety of new equipment and activities motivated the children to perform various tasks.

It is suggested that for future research, an initial investigation into the participants’ interests and the types of activities they have interest in, can guide teachers to plan more effective lessons to benefit of the children. It is also recommended that environmental constraints of children be investigated to find out how they impact the motor development children considered disadvantaged. Future research should also examine
different instructional strategies that might enhance the learning of OC skills in female children and enable them to catch up to their male peers. If answers are found to these issues, teachers can effectively teach children to eliminate gender differences as they prevailed in this study. This current study should be replicated using teachers with the same gender and over a longer period of time. The teachers’ gender and race or ethnicity was not considered in this study, but it will be of interest to observe the interactions of participants and teachers during intervention associated with the facilitators’ gender, race, and ethnicity.

*Contextual Observations*

It was observed within the mastery motivational climate group that, boys were more competitive than girls. Boys took chances trying more challenging tasks and did not show frustration even when they were not being successful. High skill girls were equally as competitive as the boys they took risks at challenging tasks and showed a lot of enthusiasm during the intervention. Girls on the other hand stayed with tasks that they were successful at and did not take risks at trying more challenging tasks. Girls showed a lot of frustration when they were not being successful at a task, and they either watched others perform or they spent much time retrieving and arranging equipment. Low skill girls liked to work directly with facilitators, they liked being observed, and they enjoyed the free activities done during warm up sessions before the teaching of skills.
Influence of FMS Intervention on the OC Skills of Young Children considered Disadvantaged

The primary purpose of this study was to examine the influence of a nine-week motor skill intervention on the OC skills of young children considered disadvantaged. From a DST perspective, the tasks for teaching OC skills were manipulated in both teaching environments in order to promote motor skill development. The participants were randomly assigned to a direct instruction and mastery motivational climate group.

The principles of developmentally appropriate practices were implemented in this study, that is: (a) making provisions of sufficient and suitable practice toward the learning goal, (b) providing a variety of tasks for learner success, (c) communicating clearly tasks and outcomes to learners, (d) selecting the critical elements and corresponding cues of performance, and (e) encouraging students to develop at their own rate (Rink, 1994; Stroot & Oslin, 1993; Sweeting & Rink, 1999). Lesson plans that were developed and used in teaching during the interventions were the same for both Intervention Groups. The feedback statements and cues provided to participants were the same for both intervention groups. Two facilitators, 1 female and 1 male, taught participants in both intervention groups. The main differences in the two approaches as used in this study was that in direct instruction the facilitators determined the level of difficulty of a task for a participant but in mastery motivational climate the participant decided on which task to perform. In direct instruction during every session, participants were randomly divided into two groups and each group spent 12 minutes at each of the two OC skill stations. In the mastery motivational climate, the same two OC skill stations were set up for each
session, but then participants sent 24 minutes performing different tasks at any of the OC skill station of their choice. The lead researcher made sure there was enough equipment for each participant throughout the intervention.

The findings from this study indicated that, both the direct instruction and mastery motivational climate significantly improved OC skill performance of participants from pre-to post-intervention in contrast to the Comparison Group who did not improve their OC skill performance over the period of the study. It appeared that both instructional approaches were valuable in promoting OC skill development in young children who are disadvantaged.

Intervention Group 1 (direct instruction) moved from the 34th percentile to the 86th percentile after the intervention. This was a very significant improvement both statistically and clinically speaking. These results can be attributed to the planning and implementation of the intervention at posttest. The primary researcher considered the performance levels of the participants before developing tasks for the intervention. During the intervention the degree of difficulty of the different tasks were increased as the participants progressed. The facilitators ensured that, all the participants were motivated to actively take part in the lessons. Feedback and cues were used regularly to teach during the interventions.

The results of this study buttress the finding of Goodway and Branta (2003), Hamilton et al. (1999), and Savage (2002) who also used direct instruction for their research and have documented that effective early motor skill intervention brings about positive changes in the motor development of young children. Goodway and Branta
found a significant improvement in intervention participants’ performances after a 12-week intervention. Participants improved from the 17th to the 80th percentile. Hamilton et al. (1999) also found significant improvement after an 8-week motor skill intervention where participants improved from the 20th to the 67th percentile. Savage (2002) found that participants improved from the 9th to 53rd percentile after an 8-week motor skill intervention.

In the current study the Intervention Group 2 (mastery motivational climate) improved from the 36th to the 90th percentile. Intervention for the mastery motivational climate was based on the TARGET model of Ames (1992). The principles of the TARGET model used were:

1. A variety of OC skills activities were presented at the stations, tasks ranged from easy to hard, facilitators prompted children to perform tasks appropriately.

2. Children decided what tasks they wanted to perform, facilitators prompted children to perform task appropriately.

3. Facilitators provided children with feedback as they performed, facilitators helped children understand the objectives of the tasks.

4. Children worked with different people at the various stations because individuals decide where to go and what task to perform.

5. Facilitators discussed children’s performance with them and give them feedback.

6. Children worked at his/her own pace and facilitators provided them with the necessary individual support as they worked on tasks.
The first two sessions of the mastery motivational climate were somewhat disorganized. It seemed that the children mostly did not understand the concept of deciding which tasks they wanted to perform. They moved from task to task and from station to station just trying out the various tasks. Towards the end of the second session most of them understood what they were expected to do during the intervention. In Intervention Group 2, it was observed that participants remained at a task they were having success with until it was suggested to them to try more challenging ones.

These finding are similar to that of Valentini and Rudisill (2004), who found that a mastery climate group was significantly better in locomotor skills than the low autonomy group but found no significant differences in the improvement of OC skills between mastery motivational climate the low autonomy group. This current study supports research that noted that children are more likely to engage in mastery motivated learning when tasks are meaningful and interesting (Ames, 1992; Valentini & Rudisill, 2004; Valentini, Rudisill, & Goodway, 1999).

From a dynamical systems theory perspective, the principles of developmentally appropriate practices and the TARGET model were very similar in the way they are implemented. They both provided avenues to help manipulate the environment and task constraints such us providing a series of tasks and activities, constraints in the children’s environment such as lack of places to play and limited opportunities to practice were considered in planning the intervention. Both direct instruction and mastery motivational climate, promote motivation as an important principle that needs to be considered when teaching motor skills.
From a DST perspective, motivation can be derived from the learner (intrinsic), the task, and the environment (extrinsic). For this study, task and environmental constraints were those that the researcher manipulated. A variety of tasks and colorful equipment were presented in various ways new to the participants, so the children were eager to try using the equipment. For example, a striking station had varied tasks for throwing (a) strike balloon with hand, (b) strike balloon with paddle, (c) strike balloons with paddles in pairs, (d) strike 8 inch beach ball with fat bat, and (e) strike 5 inch foam ball with medium size bat. The baskets, balloons, balls, the poly spots, paddles and hoops were in the different colors. This gave children the opportunity to work with their favorite colors. It was also observed that in both intervention groups, most of the time most of the participants were actively involved in the activities. This implies that their motivation to continue to perform the tasks was sustained most of the time.

The findings of this study can be related to that of findings of numerous previous studies (Goodway & Branta, 2003; Hamilton et al., 1999; Savage, 2002; Valentini, 1997; Valentini & Rudisill, 2004). In previous studies the researchers found that with effective instruction, early motor skill intervention positively influence the motor skill development of children. In this study, effective instruction in the form of direct and mastery motivational climate resulted in significant pre-to post-intervention differences in OC skills. The statistical analysis revealed an effect size of .60. According to Cohen (1988) effect size values, an effect size of .2 represents small differences, .6 represents moderate differences, and .8 and upwards represents large differences. Thus, this study resulted in a moderate effect size that could be attributed to the motor skill intervention.
Plausibly in this present study the Intervention groups improved in OC skills because both strategies used during the intervention considered developmentally appropriate practices (Rink, 1994; Stroot & Oslin, 1999; Sweeting & Rink, 1999). The findings also support the notion of providing multiple levels within tasks to aids children not to become overly frustrated with tasks that are too difficult, but also in learning to challenge themselves to find complex solutions (Ames, 1992; Valentini et al., 1999). Irregardless of the strategy used to provide instruction, according to Siedentop (1983), Metzler (1985), and COPEC (1992), if the principles of developmentally appropriate practices are followed learning will take place.

From a DST perspective, participants in both groups were treated as individuals and were instructed accordingly using developmentally appropriate tasks. Therefore, the improvement in the performance levels in both intervention groups could be attributed to effective instruction.

There were no significant differences in the pre-intervention OC skills performance between the Comparison Group, Intervention Group 1 and Intervention Group 2. This group had no instruction on OC skills throughout the period of intervention. This gave the researcher the confidence to use the group for comparison at the end of the intervention. On pretest measures the Comparison Group was at the 31st percentile and at post intervention they were at the 33rd percentile. This clearly indicated that the effective instruction during the intervention accounted for the improvement in OC skill performance in the intervention groups. It also reinforces the notion that motor skills must be practiced and taught in order to learn them (Gabbard, 2000; Haywood &
Getchell, 2002; Newell, 1984). This is an important idea for early childhood specialists who commonly assume that if children are given the opportunity to play in a playground, motor skill development will occur.

This study provided opportunities for children to learn OC skills using two instructional approaches, whose principles allowed the researcher to plan the same lessons to be taught in the two environments. The specification of feedback and cues used during the intervention in both intervention groups accounted for the consistency in the facilitators’ teaching. This ensured that the children in both intervention groups received the appropriate cues and feedback for their performances. This study reported a significant Time main effect with an effect size ($\eta^2 = .82$) which according Cohen (1988) indicates that the effect of the 9-week interventions on learning OC skills was large. All the participants in the intervention improved largely as a result of the intervention and as groups they also improved. This study shows that individuals have different learning styles so teachers and must be knowledgeable about different teaching strategies so they can chose and use appropriate strategies depending on their goals for teaching, also children must be given enough practice and time to learn.

For future research it is recommended that other strategies such as task teaching, inquiry, cooperative learning, and peer teaching could be used to teach FMS to children who are considered disadvantaged (Graham, et al., 2005). Future research should replicate this study using developmentally delayed children who have not experienced any organized physical activity.
Implications of Motor Skill Intervention with Young Children who are Disadvantaged

The results indicated that motor skill intervention improved the OC skill performance of children who are considered disadvantaged. It was also evident that both teaching approaches attributed to the improvement of OC skills. Teacher educators and teachers should find different strategies that can be used in teaching motor skills to children. Dynamical systems theory gives educators insight into how the learner, the task, and the environment interact during the learning of motor skills. If these principles are considered when teaching young children mature FMS could be developed. This study confirms the literature that suggests that girls are more developmentally delayed than boys. Teachers should note that gender differences exist among the children they teach. It is the responsibility of teachers and administrators to make sure that boys and girls are given equal opportunities to learn and acquire FMS. Girls especially need to be motivated to enjoy and participate actively in motor skills classes. As noted in this study, girls like fun activities, also and color of equipment attracted them to tasks. Teachers could use colorful equipment in setting up tasks for girls and this may get them to learn skills.

This study and several previous studies have shown that when children practice motor skills they improve (Goodway & Branta, 2003; Hamilton et al., 1999; Savage, 2002; Valentini, 1997; Valentini &Rudisill, 2004). Since early childhood programs such as Head Start are the child’s first experience with a formal educational setting, it is important that organized physical activities are included in their curriculum so they can have opportunities to learn FMS at an early age. Children considered disadvantaged have
the potential to improve their motor skills performances all they need if there is environmental support where opportunities will be provided for them to practice these skills in an organized environment. As recommended by Rink (1994) and Ames (1992), there is the needed to provide children with a wide variety of tasks and provide children opportunity to practice. This way tasks will meet the abilities of children and they will be motivated to practice and progress at their own pace. Finally, administrators and policy makers of Head Start programs need to mandate organized physical education for preschoolers, because the motor development literature supports the teaching of FMS to young children. Research has also shown that even when children are developmentally delayed they still benefit from motor skill interventions.

Future research should examine the influence of other instructional strategies on the development of young children. Follow up studies should be undertaken to find out if children retain OC skill proficiency sometime after intervention. This could help teachers determine which strategies help children retain motor skills. For example, Valentini and Rudisill (2004) noted that mastery motivational climate showed that the intervention effects were still present after six months.

*Contextual Observations*

It was observed that, about mid way through the intervention, participants had learned the rules and routines in the classes. Children could verbalize the cues they needed to perform some tasks. For example for throwing they would say sticker foot as they stepped in opposition, sticker hand as they extend their throwing arm, and throw as hard as you can and then they throw to release ball. Children were able to evaluate their
performances by relating them to the cues. Children were able to determine the degree of difficulty of the array of tasks presented to them especially those in the mastery motivational climate group. It was observed that children really liked being provided with feedback on their performance they drew the attention of facilitators for feedback when they knew they were being observed.

**Summary and Conclusions**

There is concern regarding the motor skill development of children considered disadvantaged (Goodway & Branta, 2003; Hamilton et al., 1999). A number of scholars have found that without intervention these children are developmentally delayed in their FMS development (Goodway & Branta, 2003; Goodway & Rudisill, 1997). It has been reported that early motor skill intervention can meet the developmental needs of young children growing up in poverty (Goodway & Branta, 2003; Goodway & Rudisill, 1997; Hamilton, Goodway & Haubenstricker, 1999). This current study therefore, examined the effect of two instructional approaches in physical education on the OC skills of children considered disadvantaged. The objectives were to determine: (a) the developmental level OC skill performance of children at pre-intervention; (b) the influence of gender on pre-intervention OC skill performance; (c) the influence of the different interventions on OC skill acquisition; and (d) the interaction of gender and intervention on OC skill performance from pre to post intervention.

Results form this study show that young children who are disadvantaged demonstrate pre-intervention scores on the TGMD-2 in the low part of the “average” band of OC development. However, there were significant gender effects with boys
significantly outperforming girls in OC skills. Children in the direct instruction group and
mastery motivational climate group participated in a nine-week OC skill intervention in
addition to their typical Head Start program. The findings from this study support the
notion that as little as nine weeks of OC skills intervention can bring about significant
improvement in OC skills from pre-to post-intervention. Both instructional approaches
yielded improved OC skill development of children. Gender differences persisted across
the intervention showing that girls did not catch up to their male counterparts. The
children in the Comparison Group who did not receive motor skill intervention did not
improve their OC skills from pre-to post-intervention. It appeared that without
intervention, children did not improve their motor skills.

**Summary of Findings**

1. Prior to intervention participants were at the 34\(^{th}\) percentile, which is at the lower
   end of average development.

2. Pre-intervention data indicated that females (27.63\%) had significantly lower OC
   skills than males (33.10 \%).

3. A non-significant Group effect (\(p > .05\)) was found on pre-intervention OC skill
   scores indicating that there were no group differences in the OC skill performance
   of the participants prior to the intervention.

4. There was a significant Gender effect (\(p < .001\)) on pre-intervention OC skill
   scores indicating that the boys’ performance levels were higher than girls prior to
   the intervention.
5. There was a non-significant Group X Gender interaction \((p > .05)\) on pre-intervention OC skill scores, indicating gender differences were the same in all groups prior to the intervention.

6. A 3 Group X 2 Time X 2 Gender ANOVA with repeated measures reported a significant Time effect \((p < .001)\). Post-hoc analysis revealed that both Intervention Group 1 and Intervention Group 2 improved significantly from pre-to post-intervention, whereas the Comparison Group did not improve across the intervention.

7. A 3 Group X 2 Time X 2 Gender ANOVA with repeated measures reported a significant Group X Time interaction. Post-hoc analysis revealed that Intervention Groups 1 and 2 had significantly better OC skill scores than the Comparison group from pre-to-post-intervention. There was no significant difference between Intervention Group 1 and Intervention Group 2.

8. There was non-significant Group X Gender X Time interaction. Gender did not differ by group from pre-to-post intervention.

**Summary of Implications**

1. Children in this study were considered disadvantaged but pre-intervention data showed that they were not developmentally delayed in OC skills because prior to this study they were involved in a physical activity project. Teachers and administrators need to find strategies and
information regarding the teaching of motor skills to help children to continue to develop motor skills.

2. Typically, boys have better OC skills than girls. Teachers and teacher educators have the responsibility of ensuring that females are given the necessary opportunities and support during instruction to enable them to develop motor skills to develop mature FMS.

3. Children are able to improve OC scores within nine-weeks of instruction. Teachers can be trained to teach motor skills to children in early childhood programs.

4. It is important that developmentally appropriate instruction is considered when teaching children because this study found that regardless of the teaching strategy used, children improved significantly.

5. Administrators and policy makers of Head Start programs need to mandate organized physical education for preschoolers.

**Summary of Recommendations for Future Research**

1. Examine the effect of a motor skill intervention using preschool teachers as the intervener on the learning of FMS by young children who are disadvantaged.

2. Examine of environmental constraints on OC skill development of children considered disadvantaged.

3. Examine different teaching strategies that will enhance the learning of FMS of boys and girls at different levels in schools.
4. Research should be conducted to find out what teachers can do to help girls develop FMS proficiency.

5. Research should examine the factors underlying why girls perform lower than boys.

6. Future studies should examine participants’ individual performances on each OC skill to distinguish between the various skills levels at which children start to improve their motor skill proficiency.

7. Future research should replicate this study using developmentally delayed children who do not have any organized physical activity.

8. Future research should replicate this study using teachers with the same gender and over a longer period of time.

9. Follow up studies should be undertaken to find out which strategies helped children to retain OC skills.

10. Future research should be undertaken with children from different race/ethnic, cultural, and socioeconomic backgrounds.
LIST OF REFERENCES


Valentini, N. C. (1997). The Influence of Two Motor Skill Interventions on the Motor Skill Performance, Perceived Physical Competence, and Intrinsic Motivation of


APPENDIX A

HUMAN SUBJECTS INSTITUTIONAL REVIEW BOARD APPROVAL
Research Protocol: 2002B0224

Presented for review by the Behavioral/Social Sciences Institutional Review Board to ensure the proper protection of rights and welfare of the individuals involved with consideration of the methods used to obtain informed consent and the justification of risks in terms of potential benefits to be gained.

The continuing review was APPROVED by EXPEDITED REVIEW.

NOTE: For future continuing reviews, question #17 refers to data safety and should be answered by providing where and how data is stored and who has access to it.

NOTE: The study has been approved for the participation of children according to 45 CFR 46.404. Participation in the study (completing motor skill evaluations and interventions) does not place the subjects at greater than minimal risk and adequate provisions are in place for soliciting the assent of the children and the permission of their parents or guardians as required by 45 CFR 46, section 408. The IRB determined that the permission of one parent is sufficient.

Approval for proposed research includes all materials submitted by the investigator unless otherwise noted.

It is the responsibility of the principal investigator to retain a copy of each signed consent form for at least three (3) years beyond the termination of the subject's participation in the proposed activity. Should the principal investigator leave the University, signed consent forms are to be transferred to the Behavioral and Social Sciences Institutional Review Board for the required retention period. This application has been approved for a period of not more than one year. You are reminded that you must promptly report any problems to the Review Board, and that no procedural changes may be made without prior review and approval. You are also reminded that the identity of the research participants must be kept confidential.

Date: September 28, 2005  Signed: ____________________________
Chairperson
APPENDIX B

TEST OF GROSS MOTOR DEVELOPMENT - 2
### Section I. Identifying Information

<table>
<thead>
<tr>
<th>Name</th>
<th>Justin</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>Perry Elementary</td>
</tr>
<tr>
<td>Male/Female</td>
<td>Female</td>
</tr>
<tr>
<td>Grade</td>
<td>2</td>
</tr>
<tr>
<td>Date of Testing</td>
<td>99</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>91</td>
</tr>
<tr>
<td>Age</td>
<td>8</td>
</tr>
</tbody>
</table>

### Section II. Record of Scores

#### First Testing

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Age Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locomotor</td>
<td>38</td>
<td>5</td>
<td>5-6</td>
</tr>
<tr>
<td>Object Control</td>
<td>27</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Sum of Standard Scores**: 64

**Gross Motor Quotient**: <1

#### Second Testing

<table>
<thead>
<tr>
<th>Raw Score</th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Age Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locomotor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Object Control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sum of Standard Scores**: 

**Gross Motor Quotient**: 

### Section III. Testing Conditions

A. Place Tested: School gym

<table>
<thead>
<tr>
<th>Interfering</th>
<th>Not Interfering</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Noise Level</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>C. Interruptions</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>D. Distractions</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>E. Light</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>F. Temperature</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>G. Notes and other considerations</td>
<td></td>
</tr>
</tbody>
</table>

### Section IV. Other Test Data

#### Name of Test | Date | Standard Score | TGMD-2 Equivalent
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section V. Profile of Standard Scores

<table>
<thead>
<tr>
<th>Standard Score</th>
<th>Gross Motor Quotient</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

Referral by: Kasi Holt
Reason for Referral: Physical Education Teacher
Examiner: Sarah Bailey
### Section VI. Subtest Performance Record

**Preferred Hand:** Right □  Left □  Not Established □
**Preferred Foot:** Right □  Left □  Not Established □

#### Locomotor Subtest

<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Run</td>
<td>60 feet of clear space and two cones</td>
<td>Place two cones 50 feet apart. Make sure there is at least 8 to 10 feet of space beyond the second cone for a safe stopping distance. Tell the child to run as fast as he or she can from one cone to the other when you say &quot;Go.&quot; Repeat a second trial.</td>
<td>1. Arms move in opposition to legs, elbows bent 2. Brief period where both feet are off the ground 3. Narrow foot placement landing on heel or toe (i.e., not flat footed) 4. Nonsupport leg bent approximately 90 degrees (i.e., close to buttocks)</td>
<td>0 1 1 2</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>2. Gallop</td>
<td>25 feet of clear space, and tape or two cones</td>
<td>Mark off a distance of 25 feet with two cones or tape. Tell the child to gallop from one cone to the other. Repeat a second trial by galloping back to the original cone.</td>
<td>1. Arms bent and lifted to waist level at takeoff 2. A step forward with the lead foot followed by a step with the trailing foot to a position adjacent to or behind the lead foot 3. Brief period when both feet are off the floor 4. Maintains a rhythmic pattern for four consecutive gallops</td>
<td>0 1 1 2</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>3. Hop</td>
<td>A minimum of 15 feet of clear space</td>
<td>Tell the child to hop three times on his or her preferred foot (established before testing) and then three times on the other foot. Repeat a second trial.</td>
<td>1. Nonsupport leg swings forward in pendular fashion to produce force 2. Foot of nonsupport leg remains behind body 3. Arms flexed and swing forward to produce force 4. Takes off and lands three consecutive times on preferred foot 5. Takes off and lands three consecutive times on nonpreferred foot</td>
<td>1 1 2 1 1</td>
<td>1 1 2 1 1</td>
<td>1 1 2 1 1</td>
</tr>
<tr>
<td>4. Leap</td>
<td>A minimum of 20 feet of clear space, a beanbag, and tape</td>
<td>Place a beanbag on the floor. Attach a piece of tape on the floor so it is parallel to and 10 feet away from the beanbag. Have the child stand on the tape and run up and leap over the beanbag. Repeat a second trial.</td>
<td>1. Take off on one foot and land on the opposite foot 2. A period where both feet are off the ground longer than running 3. Forward reach with the arm opposite the lead foot</td>
<td>1 1 2 0 1</td>
<td>0 1 2 0 1</td>
<td>0 1 2 0 1</td>
</tr>
</tbody>
</table>

**Skill Score:** 0 0 0 0 0 0 0 0

(continues)
<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Horizontal Jump</td>
<td>A minimum of 10 feet of clear space and tape</td>
<td>Mark off a starting line on the floor. Have the child start behind the line. Tell the child to jump as far as he or she can. Repeat a second trial.</td>
<td>1. Preparatory movement includes flexion of both knees with arms extended behind body. 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Slide</td>
<td>A minimum of 25 feet of clear space, a straight line, and two cones</td>
<td>Place the cones 25 feet apart on top of a line on the floor. Tell the child to slide from one cone to the other and back. Repeat a second trial.</td>
<td>1. Body turned sideways so shoulders are aligned with the line on the floor 1 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. A step sideways with lead foot followed by a slide of the trailing foot to a point next to the lead foot</td>
<td>1 0 0 0 0 0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. A minimum of four continuous step-slide cycles to the right 1 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. A minimum of four continuous step-slide cycles to the left 1 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**Skill Score** 0

**Object Control Subtest**

<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Striking a Stationary Ball</td>
<td>A 4-inch lightweight ball, a plastic bat, and a batting tee</td>
<td>Place the ball on the batting tee at the child's belt level. Tell the child to hit the ball hard. Repeat a second trial.</td>
<td>1. Dominant hand grips bat above nondominant hand 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Nonpreferred side of body faces the imaginary tosser with feet parallel 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Hip and shoulder rotation during swing 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Transfers body weight to front foot 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Bat contacts ball 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**Skill Score** 0

<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Stationary Dribble</td>
<td>An 8- to 10-inch playground ball for children ages 3 to 5; a basketball for children ages 6 to 10, and a flat, hard surface</td>
<td>Tell the child to dribble the ball four times without moving his or her feet, using one hand, and then stop by catching the ball. Repeat a second trial.</td>
<td>1. Contacts ball with one hand at about belt level 1 1 2 1 0 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Pushes ball with fingertips (not a slap) 1 1 2 1 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Ball contacts surface in front of or to the outside of foot on the preferred side 1 1 2 1 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Maintains control of ball for four consecutive bounces without having to move the feet to retrieve it 1 1 2 1 0 0</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

**Skill Score** 0

(continued)
<table>
<thead>
<tr>
<th>Skill</th>
<th>Materials</th>
<th>Directions</th>
<th>Performance Criteria</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Catch</td>
<td>A 4-inch plastic ball, 15 feet of clear space, and tape</td>
<td>Mark off two lines 15 feet apart. The child stands or one line and the tosser on the other. Toss the ball underhand directly to the child with a slight arc aiming for his or her chest. Tell the child to catch the ball with both hands. Only count those tosses that are between the child's shoulders and belt. Repeat a second trial.</td>
<td>1. Preparation phase where hands are in front of the body and elbows are flexed</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Arms extend while reaching for the ball as it arrives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Ball is caught by hands only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Kick</td>
<td>An 8- to 10-inch plastic playground, or soccer ball; a beanbag; 30 feet of clear space; and tape</td>
<td>Mark off one line 30 feet away from a wall and another line 20 feet from the wall. Place the ball on top of the beanbag on the line nearest the wall. Tell the child to stand on the other line. Tell the child to run up and kick the ball hard toward the wall. Repeat a second trial.</td>
<td>1. Rapid continuous approach to the ball</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. An elongated stride or leap immediately prior to ball contact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Nonkicking foot placed even with or slightly in back of the ball</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Kicks ball with instep of preferred foot (shoe-laces) or toe</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Overhand Throw</td>
<td>A tennis ball, a wall, tape, and 20 feet of clear space</td>
<td>Attach a piece of tape on the floor 20 feet from a wall. Have the child stand behind the 20-foot line facing the wall. Tell the child to throw the ball hard at the wall. Repeat a second trial.</td>
<td>1. Windup is initiated with downward movement of hand/arm</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Rotates hip and shoulders to a point where the nonthrowing side faces the wall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Weight is transferred by stepping with the foot opposite the throwing hand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Follow-through beyond ball release diagonally across the body toward the nonpreferred side</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6. Underhand Roll</td>
<td>A tennis ball for children ages 3 to 6; a softball for children ages 7 to 10; two cones; tape; and 25 feet of clear space</td>
<td>Place the two cones against a wall so they are 4 feet apart. Attach a piece of tape on the floor 20 feet from the wall. Tell the child to roll the ball hard so that it goes between the cones. Repeat a second trial.</td>
<td>1. Preferred hand swings down and back, reaching behind the trunk while chest faces cones</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Strides forward with foot opposite the preferred hand toward the cones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Tends knees toward lower body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Releases ball close to the floor so ball does not bounce more than 4 inches high</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Skill Score 6

Skill Score 4

Skill Score 1

Skill Score 8

Object Control Subtest Raw Score (sum of the 6 skill scores) 27
APPENDIX C

SAMPLE LESSON PLAN
### LESSON PLAN- SESSION 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Organization</th>
<th>Cues/Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7 mins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Opening</strong></td>
<td>Children on spots in general space</td>
<td>Encourage participation</td>
</tr>
<tr>
<td>Music to movement- 2 songs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>12 mins (DI)</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Striking**        | * Child performs in “own space” for all activities | * Stand sideways and strike
  1. Strike balloon with hand
  2. Strike balloon with paddle
  3. Strike balloons with paddles in pairs
  4. Strike 5inch ball with fat bat
  5. Strike 5 inch ball with medium size bat | * Step and strike
  * Stand sideways step and strike
  * Keep eyes on ball
| **Dribbling**       | * Child performs in “own space” for all activities | * Spread out fingers
  1. Bounce 8 inch playground ball from kneeling position
  2. Bounce 6 inch ball from kneeling position
  3. Drop playground ball with two hands and catch
  4. Drop ball with two hands and bounce with one hand 2-4x and catch
  5. Drop basket ball and bounce with one hand 2-4x and catch | * Push with your finger pads
  * Eyes ahead and push
  * Look ahead and push |
| **3 mins**          |                               |                                                                               |
| **Closure**         | Children chose animals to imitate | Reinforce main cues of the skills at each station. |
| Animal walks to the door |                               |                                                                               |

**Equipment:** Poly spots, paddles, balloons, playground balls, basketballs, 6inch balls
# LESSON PLAN - SESSION 2

<table>
<thead>
<tr>
<th>Activity</th>
<th>Organization</th>
<th>Cues/Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opening</strong></td>
<td>Music to movement - 2 songs</td>
<td>Children on spots in general space</td>
</tr>
<tr>
<td><strong>7 mins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Striking</strong></td>
<td>1. Strike beach balls with hand</td>
<td>* Child performs in “own space” for all activities</td>
</tr>
<tr>
<td></td>
<td>2. Strike beach balls with paddle</td>
<td>* Hold paddle with dominant hand away from the body and wrap the other hand below towards the body</td>
</tr>
<tr>
<td></td>
<td>3. Strike beach with paddles in pairs</td>
<td>* Step with opposing foot and strike</td>
</tr>
<tr>
<td></td>
<td>4. Strike 5 inch ball with fat bat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Strike 3 inch ball with medium size bat</td>
<td></td>
</tr>
<tr>
<td><strong>12 mins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Catching</strong></td>
<td>1. Toss bean bag in the air and catch</td>
<td>* Children stay in their own hoop to catch bean bag, playground ball and foam ball</td>
</tr>
<tr>
<td></td>
<td>2. Toss 8 inch foam ball in the air and catch</td>
<td>* Put children on the spot in a line. Teacher stands stand about 4 feet from children and tosses the ball. Teacher steps back if child is successful and forward if unsuccessful</td>
</tr>
<tr>
<td></td>
<td>3. Toss 8 inch playground ball in the air and catch</td>
<td>* Put 2 sports opposite each other about 4 feet apart. Place a child on each spot. Encourage gentle rainbow tosses to each other and catch. * Teacher may toss if children cannot toss well.</td>
</tr>
<tr>
<td></td>
<td>4. Teacher tosses foam ball towards kids’ chest area for them to catch. Teacher takes a step back to increase distance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Teach the rainbow toss</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Partner or teacher toss and catch from about 4 feet apart</td>
<td></td>
</tr>
<tr>
<td><strong>12 mins</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Closure</strong></td>
<td>Animal walks to the door</td>
<td>Children chose animals to imitate</td>
</tr>
<tr>
<td><strong>3 mins</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equipment:** Poly spots, paddles, beach balls, playground balls, 5 inch balls, 3 inch balls, beanbags
### LESSON PLAN- SESSION 3

<table>
<thead>
<tr>
<th>Activity</th>
<th>Organization</th>
<th>Cues/Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7 mins</strong></td>
<td><strong>Opening</strong></td>
<td>Children on spots in general space</td>
</tr>
<tr>
<td><strong>Music to movement- 2 songs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>12 mins</strong></td>
<td><strong>Catching</strong></td>
<td>* Children stay in their own hoop to catch bean bag, playground ball and foam ball</td>
</tr>
<tr>
<td>(DI)</td>
<td>1. Toss bean bag in the air and catch</td>
<td>* Put children on the spot in a line. Teacher stands stand about 4 feet from children and tosses the ball. Teacher steps back if child is successful and forward if unsuccessful</td>
</tr>
<tr>
<td></td>
<td>2. Toss 8 inch foam ball in the air and catch</td>
<td>* Put 2 sports opposite each other about 4 feet apart. Place a child on each spot.</td>
</tr>
<tr>
<td></td>
<td>3. Toss 8 inch playground ball in the air and catch</td>
<td>* Encourage gentle rainbow tosses to each other and catch. Teacher may toss if children cannot toss well.</td>
</tr>
<tr>
<td></td>
<td>4. Teacher tosses foam ball towards kids’ chest area for them to catch. Teacher takes a step back to increase distance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Teach the rainbow toss</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Partner or teacher toss and catch from about 4 feet apart</td>
<td></td>
</tr>
<tr>
<td><strong>12 mins</strong></td>
<td><strong>Dribbling</strong></td>
<td>* Child performs in “own space” on their spots</td>
</tr>
<tr>
<td>(DI)</td>
<td>a. Bounce 8 inch playground ball from standing position</td>
<td>* Encourage control of ball with finger tips</td>
</tr>
<tr>
<td></td>
<td>b. Bounce 6 inch ball from standing position</td>
<td>* Move around and model activity for children</td>
</tr>
<tr>
<td></td>
<td>c. Drop ball playground with two hands and catch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Drop ball with two hands and bounce with one hand 2-4x and catch</td>
<td>* Children should count the number of continuous bounces they make</td>
</tr>
<tr>
<td></td>
<td>e. Drop basket ball and bounce with one hand 2-4x and catch</td>
<td></td>
</tr>
<tr>
<td><strong>3 mins</strong></td>
<td><strong>Closure</strong></td>
<td>Children chose animals to imitate</td>
</tr>
<tr>
<td><strong>Animal walks to the door</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Equipment:** Poly spots, foam balls, playground balls, basketballs, 6inch balls
APPENDIX D

INSTRUCTIONAL TASK ANALYSIS OF OBJECT CONTROL SKILLS
INSTRUCTIONAL TASK ANALYSIS OF OBJECT CONTROL SKILLS

Strike

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strike a balloon with hand and arms</td>
<td>Stand 6 feet away</td>
<td>Towards a high, medium and low targets 6x</td>
</tr>
<tr>
<td>Strike balloon with hands and arms</td>
<td>Stand 5 feet away</td>
<td>Towards a high, medium and low targets 5x</td>
</tr>
<tr>
<td>Strike balloons with hands and arms</td>
<td>Stand 5 feet apart</td>
<td>To partner 5x</td>
</tr>
<tr>
<td>Strike balloons with hands and arms</td>
<td>Stand in own space</td>
<td>To self 5 x</td>
</tr>
</tbody>
</table>

Striking with Paddles

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand 5 feet apart</td>
<td>6x in a row to partner</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand 5 feet apart</td>
<td>6x in a row to partner</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand 5 feet apart</td>
<td>6x in a row to partner</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand 4 feet apart</td>
<td>4x in a row to partner</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand in own space</td>
<td>6x to self</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand in own space</td>
<td>6x in a row to self</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand in own space</td>
<td>4x in a row to self</td>
</tr>
<tr>
<td>Strike a balloon with a paddle</td>
<td>Stand in own space</td>
<td>4x in a row to self</td>
</tr>
</tbody>
</table>
### Striking with Bats

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 3 inch ball on a tee or cone, using 4 of 4 critical elements (10x)</td>
</tr>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 3 inch ball on a tee or cone, using 3 of 4 critical elements (8x)</td>
</tr>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 3 inch ball on a tee or cone, using 2 of 4 critical elements (8x)</td>
</tr>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 3 inch ball on a tee or cone, using 1 of 4 critical elements (6x)</td>
</tr>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 4 inch ball on a tee or cone, using 3 of 4 critical elements (6x)</td>
</tr>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 4 inch ball on a tee or cone, using 2 of 4 critical elements (6x)</td>
</tr>
<tr>
<td>Strike a ball with a bat</td>
<td>Stand with side toward tee</td>
<td>Use a fat bat, 4 inch ball on a tee or cone, using 1 of 4 critical elements (6x)</td>
</tr>
<tr>
<td>Task</td>
<td>Situation</td>
<td>Criteria</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Throw a tennis ball forcefully overhand to target on wall</td>
<td>Stand 15 feet from a wall</td>
<td>Use 4 to 5 critical elements (10x)</td>
</tr>
<tr>
<td>Throw a tennis ball forcefully overhand to wall</td>
<td>Stand 10 feet from a wall</td>
<td>Use 4 to 5 critical elements (10x)</td>
</tr>
<tr>
<td>Throw a tennis ball overhand against a wall</td>
<td>Stand 5 feet from a wall,</td>
<td>Use 3 to 4 critical elements (8x)</td>
</tr>
<tr>
<td>Throw yarn ball overhand at target on wall</td>
<td>Stand 8 feet from a wall</td>
<td>Use 3 to 4 critical elements (8x)</td>
</tr>
<tr>
<td>Throw yarn ball overhand through hoop held by partner</td>
<td>Stand 6 feet from hoop</td>
<td>Use 3 to 4 critical elements (6x)</td>
</tr>
<tr>
<td>Throw yarn ball overhand against a wall</td>
<td>Stand 6 feet from wall</td>
<td>Use 3 to 4 critical elements (6x)</td>
</tr>
<tr>
<td>Throw a yarn ball overhand against a wall</td>
<td>Stand 5 feet from a wall</td>
<td>Use 3 to 4 critical elements (6x)</td>
</tr>
<tr>
<td>Throw a scarf away from you</td>
<td>Stand in own space</td>
<td>Use 3 to 4 critical elements (6x)</td>
</tr>
</tbody>
</table>
### Catch

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Move to catch a tossed ball</td>
<td>With partner standing 15 feet apart</td>
<td>Move to catch a tennis ball with hands from ready position using 4 the 5 critical elements (10x)</td>
</tr>
<tr>
<td>Catch an underhand tossed ball from ready position</td>
<td>With partner standing 15 feet apart with knees slightly bent</td>
<td>Catch a tennis ball using 3 to 4 critical elements. (10x)</td>
</tr>
<tr>
<td>Catch an underhand tossed ball from ready position</td>
<td>With partner standing 10 feet apart with knees slightly bent and hands out.</td>
<td>Catch a 6 inch playground ball using 3 to 4 critical elements (10x)</td>
</tr>
<tr>
<td>Catch an underhand tossed ball from ready position</td>
<td>With partner standing 6 feet apart with knees slightly bent and hands out.</td>
<td>Catch a 6 inch playground ball using 3 to 4 critical elements. (8x)</td>
</tr>
<tr>
<td>Catch an underhand tossed ball from ready position</td>
<td>With partner standing 10 feet apart with knees slightly bent and hands out</td>
<td>Catch an 8 inch playground ball using 3 to 4 critical elements (8x)</td>
</tr>
<tr>
<td>Catch an underhand tossed ball from ready position</td>
<td>With partner standing 5 feet apart with knees slightly bent and hands out.</td>
<td>Catch an 8 inch playground ball using 3 to 4 critical elements (6x)</td>
</tr>
<tr>
<td>Bounce and catch ball</td>
<td>Stand with knees slightly bent in own space</td>
<td>Bounce and catch an 8 inch playground ball with hands (6x)</td>
</tr>
<tr>
<td>Throw a scarf into the air and catch it</td>
<td>Stand in own space</td>
<td>Catch scarf with hands (6x)</td>
</tr>
<tr>
<td>Catch a rolled ball with the hands</td>
<td>With partner, sit 6 feet apart facing in a straddle position</td>
<td>Reach for an 8 inch playground ball with hands (6x)</td>
</tr>
</tbody>
</table>
## Kick

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kick a stationary ball</td>
<td>Run fast over 10 feet</td>
<td>Step to kick an 8 inch playground ball at a target using 3 to 4 critical elements (10x)</td>
</tr>
<tr>
<td>Kick a stationary ball</td>
<td>Run fast over 6 feet</td>
<td>Step to kick an 8 inch playground ball using 3 to 4 critical elements (8x)</td>
</tr>
<tr>
<td>Kick a stationary ball</td>
<td>Run slowly over 6 feet</td>
<td>Step to kick an 8 inch playground ball using 3 to 4 critical elements (6x)</td>
</tr>
<tr>
<td>Kick a stationary ball</td>
<td>Walk 6 steps</td>
<td>Step to kick an 8 inch playground ball using 3 critical elements (6x)</td>
</tr>
<tr>
<td>Kick a stationary ball</td>
<td>Take 3 steps</td>
<td>Kick an 8 inch playground ball using 3 critical elements (6x)</td>
</tr>
<tr>
<td>Kick a balloon around</td>
<td>Move around gym</td>
<td>Follow ball and kick it around (3 minutes)</td>
</tr>
<tr>
<td>Kick an imaginary ball</td>
<td>Stand in own space</td>
<td>Step and kick imaginary ball (4x)</td>
</tr>
</tbody>
</table>
### Bounce

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bounce and catch ball</td>
<td>In own space</td>
<td>Bounce an 8 inch playground ball with one hand 5 times and catch (5x)</td>
</tr>
<tr>
<td>Bounce and catch ball</td>
<td>In own space</td>
<td>Bounce an 8 inch playground ball with other hand 3 times and catch (5x)</td>
</tr>
<tr>
<td>Bounce and catch ball</td>
<td>In own space</td>
<td>Bounce an 8 inch playground ball with one hand 3 times and catch (5x)</td>
</tr>
<tr>
<td>Bounce and catch ball</td>
<td>In own space</td>
<td>Bounce an 8 inch playground ball with other hand once and catch (5x)</td>
</tr>
<tr>
<td>Bounce and catch ball</td>
<td>In own space</td>
<td>Bounce an 8 inch playground ball with one hand once and catch (5x)</td>
</tr>
<tr>
<td>Bounce and catch ball</td>
<td>In own space</td>
<td>Bounce an 8 inch playground ball with both hands once and catch (5x)</td>
</tr>
</tbody>
</table>
### Roll

<table>
<thead>
<tr>
<th>Task</th>
<th>Situation</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll at target</td>
<td>In own space</td>
<td>Bend, step and roll a tennis ball over 8 feet at target placed at wall(10x)</td>
</tr>
<tr>
<td>Roll at target</td>
<td>In own space</td>
<td>Bend, step and roll a tennis ball over 8 feet at wall (8x)</td>
</tr>
<tr>
<td>Roll at target</td>
<td>Stand 10 feet from wall</td>
<td>Bend, step and roll a 4 inch playground ball at target placed against wall (8x)</td>
</tr>
<tr>
<td>Roll at target</td>
<td>Stand 8 feet from wall</td>
<td>Bend, step and roll a 4 inch playground ball at target placed against wall (8x)</td>
</tr>
<tr>
<td>Roll from a close distance</td>
<td>With partner</td>
<td>Bend, step and roll an 8 inch playground ball over 5 feet to partner (6x)</td>
</tr>
<tr>
<td>Roll from a close distance</td>
<td>With partner</td>
<td>Bend and roll an 8 inch playground ball over 5 feet to partner (6x)</td>
</tr>
</tbody>
</table>
### Instructional Skill Analysis and Cue sheet

Identify the efficiency level currently demonstrated for each skill. Select the corresponding cue in order to prompt the child to demonstrate the more mature pattern of the next efficiency level.

<table>
<thead>
<tr>
<th>SKILLS</th>
<th>EFFICIENCY A</th>
<th>EFFICIENCY B</th>
<th>EFFICIENCY C</th>
<th>CUES</th>
</tr>
</thead>
</table>
| THROW  | Throw looks like “chopping action,” Feet remain stationary, No trunk rotation | Wind-up begins near child’s ear, As arm moves forward child steps forward with foot on same side as throwing arm, Some trunk rotation | Wind-up begins near child’s leg, Arm is brought back and then up near ear, As arm moves forward child steps with opposite foot, Rotation begins in lower body and progresses to upper throughout the action | A: Step and throw  
B: Throw as hard as you can  
C: Step and throw as hard as you can |
| CATCH  | Arms held straight in front until ball contact, Delayed response to ball, Feet stationary | Arms held in front, As ball approaches arms “scoop” under ball to trap it to chest, Sometimes single scoop occurs | Hands held in front, child contacts ball with hands only, Sometimes a single step occurs | A: Watch the ball  
B: Catch with your hands  
C: Hands ready, move to the ball |
| KICK   | Little or no leg wind-up, Stationary position, Foot “pushes” ball, Step backward (usually) after kick | Leg wind-up to the rear, Stationary position, Opposition of arms and legs | Moving approach, Foot travels in a low arc, Arm/leg opposition, Forward or sideward step on follow through | A: Step and kick  
B: Run and kick  
C: Kick as hard as you can |
| STRIKE | Horizontal swing, Strike looks like “slamming the door,” Entire body rotates, Feet stationary or some stepping | Upon swinging child steps toward target with the foot on the striking side of the body | Same as previous, only the step occurs with the foot opposite the striking side of the body, Body rotation begins in lower body and progresses to upper throughout the action | A: Stand sideways and strike  
B: Step and strike  
C: Stand sideways, step, and strike |
| ROLL   | No backward swing of the arm, feet stationary, little or no trunk bending in attempt to lower the body | Some backward swing of the arm, feet stationary or ipsilateral step, knees bend in attempt to lower the body | Preferred hand swings down and back behind the trunk, strides forward with opposition, bends knees, releases ball close to the floor | A: Get low and roll  
B: Step, low, and roll  
C: Arm way back, step, low, and roll |
| DRIBBLE | Hand(s) stiff and “slapping” of the ball occurs, Eyes downward, little or no control of the ball | Fingertips used to “push” ball most of the time, Eyes downward, Feet stationary or move with the ball, little ball control | Contacts (pushes) ball with one hand and maintains dribble at about waist level, Able to look up and dribble, Maintains dribble for at least 4 consecutive bounces | A: Push with your pads  
B: Eyes ahead and push  
C: Walk, look ahead, and push |
## INTERVENTION INTEGRITY WORKSHEET

**Date:**

**Session:**

<table>
<thead>
<tr>
<th>QUESTIONS</th>
<th>Station 1 Activity:</th>
<th>Station 2 Activity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did facilitator provide clear instructions at station?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Did facilitator demonstrate skills?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Were activities individualized for all students?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Did participants have their own equipment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Did facilitator provide consistent cue words?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Did facilitator cue for the next level of efficiency?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Did facilitator use positive-specific feedback?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Did facilitator use corrective feedback?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Did participants spend 10-minutes at (DI) station, and 24-minutes during MMC?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Did facilitator assist participants as they perform different tasks?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total % YES**

---

Note YES = 1 NO = 0
APPENDIX G

FACILITATORS’ TRAINING PROTOCOL
FACILITATORS’ TRAINING PROTOCOL

1. Review of stages of fundamental motor skills (FMS).
   __ Facilitators were provided with a table with the various components of object control skills.
   __ Primary investigator lead discussion on the stages of FMS.
   __ Videotapes of children performing FMS were played and facilitators identified the stages at which they performed. There was a group discussion of tapes first and then individual coding. Facilitators received 85% and above accuracy on coding videotapes.
   __ Live coding of stages were done observing children perform. A minimum of 85% accuracy was expected.

2. Test of Gross Motor Skills (TGMD-2)
   __ Facilitators were taught how TGMD-2 was used in assessing motor skills.
   __ Critical elements of object control skills were discussed and demonstrated.

3. Direct instruction and mastery motivational climate.
   __ Instructional strategies were discussed.
   __ Similarities and differences of strategies were discussed.

4. Discuss feedback and cues for object control skills.
   __ Types of feedback were discussed
   __ Primary researcher provided sample lesson plans for discussion
   __ Facilitators taught in a motor development lab to practice providing feedback and cues.

5. Evaluation
   __ Facilitators were taught how to assist participants to monitor and evaluate their skills.
APPENDIX H

OPPORTUNITY TO RESPOND INSTRUMENT
OPPORTUNITY TO RESPOND INSTRUMENT

Name of Participant………………………………………………………………

Date………………………………………………………………………………

Observer………………………………………………………………………

Object control skill……………………………………………………………

Make a tally in the appropriate box each time the target child performs a skill. And indicate the tasks performed under task. Total the number of trials at the end.

<table>
<thead>
<tr>
<th>Correct trial</th>
<th>Incorrect trail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total trials
Time
Rate per min.
Task
Stage of performance
APPENDIX I

TEACHER FEEDBACK INSTRUMENT
Feedback Instrument

Facilitator:

Date:

Participant:

Station:

<table>
<thead>
<tr>
<th>Type of feedback</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modeling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual manipulation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CATEGORY DESCRIPTION**

**Positive feedback**: Praise that follows a skill attempt, for example "Good job".

**Negative feedback**: Scolding that follows a skill attempt, for example “That was not good”.

**General feedback**: Information that clarifies the intent of performance, for example “attempt”.

**Specific feedback**: Specific information to the learner on performance, for example Good job, you stepped before kicking”.

**Corrective feedback**: Information on what to do or not to do in a future performance, for example “Next time step with the opposing foot”.

**Evaluative feedback**: Judgment about a past performance, for example ”Good rotation of the hip”.

**Modeling**: Antecedent stimulation that is topographically identical to the behavior the teacher wants imitated. For example a demonstration by teacher or a skilled peer

**Manual manipulation**: Physical guidance of the body to assist the child.