728

PRIMARY SCHOOL TEACHERS' AND P.E. TEACHERS' ACCURACY IN ASSESSING CHILDREN'S GROSS MOTOR PERFORMANCE

Timo Parkkinen

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Department of Physical Education
University of Jyväskylä

ABSTRACT

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The purpose of this study was to investigate the accuracy of primary school teachers and physical education teachers in assessing children's gross motor development with a test instrument. The additional goal was to introduce the possibilities of qualitative gross motor ability assessment of children to Finnish physical educators. The study was completed by using the Test of Gross Motor Development (TGMD), which measures the gross motor abilities of children between 3 to 10 years of age. The test measures motor ability in 12 gross motor areas divided into two subtests.

Subjects were secondary school physical education teachers (n=26) and primary school teachers (n=26), also teaching physical education in their schools. None of them had previous experience in assessing children with TGMD. A videotape where four different children performed 12 gross motor skills three times, was presented to the subjects. The task was to observe and score the performances according the performance criteria. The data were analysed by group, age, sex and teacher experience. Statistical significance was tested with correlations, chi-square-tests and t-tests.

The results indicated that the scorings of primary school teachers differed more from the true score than the scorings of physical education teachers. The teachers with longer teacher experience did not have more accurate scores than the teachers with less experience.

Teachers experienced scoring very or moderate difficult. In their opinion, the easiest locomotor skill to score was slide and the most diffcult was horizontal jump. The easiest object control skills were catch and stationary bounce, and the scorings also deviated least in these skills. According to both teachers' opinion and score deviations, the most difficult skill was kick.

Physical education teachers were more competent in assessing children's gross motor skills than primary school teachers. The results support the assumption that in assessing gross motor skills the teacher's experience is less important, but understanding the principles of motor behaviour and training to use the assessment instruments are more essential parts of objective evaluation.

Key words: motor development, developmental coordination disorder, motor assessment, criterion-referenced test

CONTENTS

INTRODUCTION

During school years, children are required to show proficiency in a number of motor skills in the classroom, in the playground and out on the games field. Such skills as writing, drawing, manipulating and constructing, are everyday requirements in the classroom, while outside, locomotor skills, throwing, catching, striking and kicking are seen in both organised and non-organised activities. The acquisition of motor skills ought to be regarded by teachers as an essential component of school learning, and failure to acquire these skills should be acknowledged as a learning difficulty commensurate with difficulties in other domains.

Many follow-up studies (Ahonen 1990; Cantell, Smyth & Ahonen 1994; Geuze & Börger 1993; Losse et al. 1991) have found that about half of the children experiencing motor problems in early school years remained clumsy well into the adolescent period. These childrens' motor problems do not improve spontaneously. Early intervention can lead to significant improvements in motor development.

Identifying the needs of children with motor difficulties and measuring the progress are the basis of intervention programs. However, one of the problems of physical education is the testing and evaluation of the motor skills of children with disabilities. Although new knowledge has become available, many physical educators have not applied the information to their practices.

The purpose of this study was to consider whether motor difficulties would be identified with any consistency by different educators. Additional aims were to investigate the objectivity of the gross motor test and to introduce to physical educators an assessment instrument based on a qualitative statements of motor performance.

1. GROSS MOTOR DEVELOPMENT

1.1. Terminology

In understanding the field of motor development the knowledge of the terms commonly used in this area is a basic requirement.

The terms 'development' and 'growth' are sometimes used as synonyms, but they have slightly different emphasis. *Development* refers to changes in the individual's level of functioning, emerging ability to function on a higher level (Davis 1991, 262; Gallahue & Ozmun 1997, 14; Holopainen 1991, 11; Takala & Takala 1988, 97). *Growth* instead refers to a quantitative increase in the size of body or its parts as the child progresses toward maturity (Gallahue & Ozmun 1997, 14; Haywood 1993, 7). Biologically, it is the multiplication or enlargement of cells.

The elements of maturation and experience play a key role in the developmental process. *Maturation* refers to qualitative changes that enable one to progress to higher levels of functioning. It is genetically determined and resistant to environmental influences.(Dunn 1997, 15; Gallahue & Ozmun 1997, 15; Sherrill 1998, 273; Takala & Takala 1988, 97.) *Experience* refers to factors within the environment that may alter or modify the appearance of various developmental characteristics through the process of learning. The term *adaptation* refers to the interplay between forces within the individual and the environment. (Gallahue & Ozmun 1997, 15.)

1.1.1. Motor

The term *motor* is rarely used alone. It refers to the underlying biological and mechanical factors that influence movement. *Learning* is defined as a relatively permanent change in behaviour resulting from experience and training interacting with biological processes. *Motor learning* is that aspect of learning in which body movement plays a major part. *Motor behaviour* is that aspect of motor learning that embodies learning and performance factors and maturational processes associated with movement performance. *Motor control*

is that aspect of motor learning that describes the underlying processes involved in the performance of a movement act that are consistent (from trial to trial). (Gallahue & Ozmun 1997, 15; Haywood 1993, 7.)

Motor development is the progressive change in motor control and motor behaviour brought about by interaction of both maturation and experience as evidenced throughout life by observable movement (Gallahue & Ozmun 1997, 19; Holopainen 1991, 11). The terms *motor pattern, fundamental motor pattern, motor skill* and *perceptual motor skill* all refer to the underlying sensory, integrative and decision-making processes that precede the performance of an observable movement. Perception and cognition are important variables because they influence underlying motor processes. Underlying motor processes are involved in the performance of all voluntary movement. (Gallahue & Ozmun 1997, 18.)

1.1.2. Movement

There is often an overlap in the use of terms describing movement. Yet there may be subtle differences. The term *movement* refers to actual observable change in position of any part of the body, which is an act of the underlying processes. A *movement pattern* is an organized series of related movements. A *fundamental movement pattern* refers to the observable performance of basic locomotor, manipulative and stabilizing (or nonlocomotor) movements (e.g. running, throwing, twisting). Usually two or more body segments are involved in patterns.

A *movement skill* is often used as a synonym for movement pattern. It refers to development of motor control, precision, and accuracy in the performance of both fundamental and speciliazed movements (Gallahue & Ozmun 1997, 18). In addition movements are often classified as gross and fine movement.

Movement skills can be categorized into broad categories of stability, locomotion and manipulation which represent the primary focus for motor development (Figure 1).

STABILITY MOVEMENT SKILLS	LOCOMOTOR MOVEMENT SKILLS	MANIPULATIVE MOVEMENT SKILLS
Bending	Walking	Throwing
Stretching	Running	Catching
Twisting	Jumping	Kicking
Turning	Hopping	Trapping
Swinging	Skipping	Striking
Inverted supports	Sliding	Volleying
Body rolling	Leaping	Bouncing
Landing	Climbing	Ball rolling
Stopping	Punting	
Dodging		
Balancing		

FIGURE 1. The fundamental movement skills (Gallahue 1993, 19)

No comprehensive theory of motor development exists (Gallahue & Ozmun 1997, 58). Theories of motor development are broad in nature, they attempt to explain all aspects of behaviour. Most theories of development do not deal with movement as an integral part of the model, but view it instead in terms of how it impacts on cognition and affective development.

1.2. Factors affecting motor development

The process of motor development is influenced by a number of biological and environmental factors operating both in isolation from and in combination with one another. The interaction of these factors in the phases and stages of motor development make each individual's developmental schedule unique (Dunn 1997, 16; Gallahue 1993, 83; Gallahue & Ozmun 1997, 74). Both the process and product of the child's physical movement and physical performance are rooted in his or her unique genetic and experimental background. (Gallahue & Ozmun 1997, 81)

1.2.1. Developmental sequence

There can be recognised four main phases in motor development:

1. Reflexive movement phase
2. Rudimentary movement phase
3. Fundamental movement phase
4. Sport-related movement phase

(Gallahue & Ozmun 1997, 89)

These four phases of motor development, each containing two or three stages, make up the hierarchial sequence of motor development. Each successfully completed phase and stage of development leads to higher levels of functioning. Individuals are often at different stages of development within tasks and between tasks.

Motor control develops in cephalocaudal and proximodistal directions. Cephalocaudal development refers to the gradual progression of increased control over the musculature, moving from the head to the feet. Proximodistal development refers to progression in control of the musculature from the center of the body to the most distant parts, hands and fingers. (Dunn 1997, 15; Gallahue 1993, 83; Haywood 1993, 45-46; Pyfer 1983; Sherrill 1998, 445-446)

1.2.2. Physiological factors

All neurological systems have an important role in developing motor control. Careful observation will help the teacher determine which sensory-motor areas are failing to develop normally. Once we determine where delays are occurring, we can select approriate activities to facilitate neuromuscular development.

The motor development of a child follows the neuromotor maturation. During the first year the physical control of the child's movement is centered in the lower portions of the central nervous system (CNS). A series of reflexes enables children to lift their heads, balance on all fours, turn their heads toward an outstretched hand and grasp objects (Stewart 1990, 4).

By the end of the first year cortical control is beginning to develop. The child can visually track moving objects, can stand and, in most cases, can walk. These functions are possible only if the CNS has been stimulated enough to permit development of motor pathways from the spinal cord through the cortical level.

During the ages of 1 to 4 years the ability to walk, run and jump develops and matures. Myelination of nerve fibres connecting the cerebral cortex to the cerebellum enables the child to begin to progress from jerky, staccato movement patterns to more fluid, rhytmical motions (Pyfer 1983; Stewart 1990, 3). Myelination is the process which coats the nerve axons in the fatty sheath of myelin. Any delay in the myelination process can lead to permanent retardation.

From ages 4 to 8 years movement capability is more closely related to physiological maturation than to chronological age. During these years all basic locomotor skills mature from poorly integrated to finely coordinated patterns. (Gallahue, 1993, 88; Pyfer 1983)

1.2.3. Environmental factors

The influence of environmental factors on motor development has been acknowledged in many studies (Cintas 1988, Williams & Williams 1987). The parental factors influenced by socioeconomical differences, sex differences, birth order, and ethnic and cultural background have all been shown to have an impact on the motor development of children. (Gallahue & Ozmun 1997, 93; Malina 1980). But in spite of these and other studies there appears to be no well developed theory of how maturational and environmental factors interact to influence development.

1.2.4. Mental development

Efficient cognitive processing is required for succesfully performing a motor skill (Kerr & Hughes 1987, 73). The motor ability of children constitutes an important component of their feeling of competence in coping with their environment (Ausubel, Sullivan & Ives 1980, 475). Beginning with middle childhood enhanced motor competence becomes a major source of earned status and an instrument of desatellization. Increased motor competence helps to reduce frustrations in childhood that are occasioned by inability to manipulate objects and play materials as desired. The executively independent child is more free to explore the wider community with some feelings of assurance. Motor activity is also an important outlet for emotional expression (fear, flight, rage, aggression) and a source of basic satisfactions and self-expression. (Kerr & Hughes 1987.)

1.2.5. Social development

Not the least important aspect of motor development is its connections to social participation and adjustment. The social-cultural milieu of the child plays an important role in the direction and extent of motor development of the child (Gallahue & Ozmun 1997, 93).

Being physically competent is valued by children. Chase and Dummer (1992) found that boys rated 'being a good athlete' as the most important criterion for male social status. Conversely, children with movement difficulties are accompanied by lack of confidence, poor motivation, low self-esteem, depression and social isolation as young as 6 years of age (Schoemaker & Kalverboer 1994). Furthermore, the feelings of anxiety and potential failure raise when confronted by movement tasks. On the other hand, some children's lack of confidence in the motor domain contrasts sharply with their academic and social success.

2. MOTOR DEVELOPMENT PROBLEMS

Children experiencing movement problems will do so for a variety of reasons ranging from those associated with sensory and perceptual difficulties, through planning and organisational deficiencies, to an inefficiency in the neuromotor system. A less than adequate performance in any of these processes may result in a disorder of movement. (Sugden & Wann 1987, 226.)

2.1. Delay, dissociation and deviancy

Capute, Shapiro & Palmer (1981) proposed a way of assessing developmental problems in terms of general categories of delay, dissociation and deviance. They see *delay* as a lower rate or level of development in one aspect of movement skill development, such as locomotion. Developmentally delayed child fails to demonstrate normal cognitive and psychomotor milestones of growth (Pyfer 1983). Delay can imply that a child will catch up with the passage of time, or a more cautious assertion of the possibility of spontaneus catch-up (Losse et al. 1991, 65). *Dissociation* is a difference in rate of development among different aspects of movement skill development, especially in perceiving and organizing parts into wholes (Dunn 1997, 350; Sherrill 1998, 511). *Deviancy* refers to the developmental progression that is different rather than delayed. These three categories apply to rate and quality of development within and among general areas of development (Sugden & Keogh 1990, 152).

A growing body of research suggests children with movement problems can mature and function efficiently if their problems are recognized early and if appropriate intervention strategies are initiated.

2.2. Motor development problems and learning disabilities

According to Kirk (1987) learning disabilities consist of two broad categories: developmental and academic. Developmental learning disabilities affect the prerequisite skills that a child needs in order to learn the academic subjects. Children with learning disabilities are typically uncoordinated and inaccurate in motor responses. They frequently

exhibit problems related to perception, imagery and perception (Dunn 1997, 350). At the 8-year-old level, on a criterion set in the Test of Motor Impairment (Stott, Henderson & Moyes 1986), there were ten times as many movement problems in children with learning difficulties compared to normal school children (Sugden & Wann 1987).

Conversely, several studies have demonstrated that being clumsy in early years carries an increased risk of other learning difficulties at school age (e.g. Lyytinen & Ahonen 1989 ; Silva & Ross 1980). In a study of Ahonen (1990, 71, 77) teachers estimated that 74 % of children with motor difficulties exhibited also learning difficulties in the areas of reading, writing and mathematics.

Children with learning disabilities demonstrate a greater amount of abnormal reflexes (Gorman 1983). Kerr & Hughes (1987) argue that motor difficulties of children with learning disabilities may not be due to major processing deficit but in getting information into the processing system (input/output mechanisms). When successfully facilitating sensory and perceptual-motor integration performance, children with learning disabilities not only will demonstrate normal motor function, but will continue to develop further at the same rate as their peers (Broxterman & Stebbins 1981).

Parents are generally more concerned about clumsiness in fine motor tasks than in gross motor activity. The correlation between fine motor and gross motor activities is low. Motor disturbances in children have been found to occur for a variety of reasons because adequate motor performance is an end product requiring the integrity of many different neurological functions (Cermak 1985, 230).

2.3. Developmental Coordination Disorder

Movement skill problems of children have been identified and studied in diffuse and vague ways (Ahonen 1990, 6). One indication of this lack of concensus about the concept is the diverse terminology used. Gubbay (1975a, 1975b) and Henderson and Hall (1982) used the term *clumsy*, but also *developmental apraxia and agnostic ataxia* (Gubbay 1978). Gubbay views condition as an "impaired ability to perform skilled, purposive movements

by mentally normal children who otherwise are mentally normal have adequate sensation and strength". Ayres (1972; 1985), Cermak (1985) and Denckla (1984) used the term *developmental dyspraxia* believing that children having this condition possessed a motor planning problem.

Many other terms have also been used such as *physically awkward* (Causgrove Dunn & Watkinson 1994; 1996; Wall 1982), *poorly coordinated* (Cratty 1994), *perceptuomotor dysfunction* (Laszlo, Bairstow, Bartrip & Rolfe 1988), *motor delay* (Henderson 1994) and *movement difficulties* (Sugden & Keogh 1990; Thompson, Bouffard, Watkinson & Dunn 1994). Losse et al. (1991) have used the term *clumsy child syndrome*, often accompanied by learning difficulties, school problems and psychological problems.

American Psychiatric Association (1994) uses the term Developmental Coordination Disorder (DCD) in the Diagnostic and Statistical Manual of Mental Health Disorder (DSM-IV) to describe children with a marked impairment in the development of motor coordination that is not explainable by mental retardation or a known physical disorder. All these terms differ from each other not only by the nature of the motor difficulties of the child but also in the pattern of his or her performance in other domains. Both of these aspects have implications for assessment (Henderson 1987).

Although the term 'clumsy' occurs most frequently throughout the English literature (Missiuna, Kempton & O'Leary 1994), the term has unfavorable connotations (Johnston, Short and Crawford 1987). Further in this study the term DCD has been chosen to describe children with motor coordination problems.

2.3.1. Prevalence

The percentage of children with DCD varies between 5 and 15 % of school age children (American Psychiatric Association 1994; Cratty 1986; Gubbay 1975b; Henderson & Hall 1982; Iloeje 1987; Johnston et al. 1987; Keogh, Sudgen, Reynart & Calkins 1979; Missiuna 1994; van Dellen & Geuze 1988). The gender ratio varies from 5:1 boys (Missiuna 1994; van Dellen & Geuze 1988) to 7:1 (Dewey 1991). Handedness do not seem

to differentiate the subjects (Missiuna 1994; O'Hare & Brown 1989). The prevalence depends on the measuring instrument and criteria for selection.

2.3.2. Description of motor problems

Children with DCD do not show a single pattern of deficits. Skilled motor behaviour is the outcome of an intricate interaction between perceptual and motor processes. Information gathered by the perceptual systems are organized to goal-directed movements. There are a number of characteristics that have been repeatedly identified in the literature.

Hoare (1994) have identified five subtypes within the DCD population, with different patterns of dysfunction emerging:
a) children with differences in static balance and run
b) children with difference in skills requiring visual judgments
c) children with difficulty in both visual and kinesthetic tasks
d) children characterized by particularly good kinesthetic processing
e) childen with difficulty in executing motor tasks

Missiuna (1994) described three possible causes for variability in competence across a range of motor skills:
a) children with DCD might have difficulty in learning new complex motor skills (Denckla 1984)
b) children with DCD can learn the motor skills that are situation specific ("splinter skills"), but cannot generalize them to new situations (Ayres 1985; Cermak 1985; Denckla 1984; Googold-Edwards & Cermak 1990)
c) children with DCD are simply more variable than their peers when performing motor tasks. (Geuze & Kalverboer 1987; van Dellen & Geuze 1988; Wann 1986; 1987)

Children with DCD are found to be delayed in the acquisition of age-appropriate motor skills. They are also slower than their chronological peers in motor planning and motor execution phases (Geuze & van Dellen 1990; Henderson, Rose & Henderson 1992; Missiuna 1994; van Dellen & Geuze 1988). The slowness was present during the learning

of the task and when the motor skill was generalized. Children with DCD benefited more directly from repeated exposure to the specific task (Missiuna 1994).

Sensory functions of children with DCD may be more poorly developed than those of children with normal motor development. Williams, Woollacott and Ivry (1992) have reported defiencies in both motor and perceptual timing of children with DCD. They have also showed deficits in selected visual perception behaviours (Hulme, Biggerstaff, Moran & McKinlay 1982; Lord & Hulme 1987) and in processing proprioceptive information (Smyth & Glencross 1986). These deficits play a key role in DCD. Van der Meulen et al. (1991a, 1991b) have claimed that children with DCD have longer movement times than control children during fast aiming movements. When visual feedback was allowed, the differences increased. Wann (1987) hypothesized that children with DCD adopted a movement strategy - to slow down the movement - in order to allow visual feedback to make a larger contribution to movement accuracy.

In monitoring their movements, children with DCD may rely more heavily on vision, possibly due to delayed or deviant development of motor control. This can also be a result of an impairment of visual memory for motor sequences when imitating the actions (Dewey 1991; Dwyer & McKenzie 1994).

In addition to visual perceptual deficits, also deficits in kinesthetic perception are shown in DCD (Hoare & Larkin 1991; Laszlo & Bairstow 1985). Kinaesthesis refers to the motor control prosess, where information is gathered through different receptors to provide knowledge about the body's position and movement (Sugden & Wann 1987). Both kinds of perceptual deficits may co-occur in same children (Hoare 1994). Therefore the motor problems of children with DCD may be cumulative as tasks become more complex (Missiuna 1994).

The motor control deficits exhibited by children with DCD include poor balance and postural control (Baker 1986; Gubbay 1978) as well as inadequate or inappropriate interlimb or total body coordination and control of distal extremities (Williams et al. 1992). These latter motor performance problems often take the form of poor integration of

upper and lower body movement. For example, clumsiness may be apparent in body projection skills, such as jumping, running, hopping and galloping, or in object manipulation, such as throwing, striking and catching.

In children with DCD, propulsion during explosive motor tasks (e.g. hop and standing broad jump) is less than that observed in children who are well coordinated (Larkin & Hoare 1992). That inability, resulting from less intensive activity, may affect the development of anaerobic power (O'Beirne, Larkin & Cable 1994).

Children with DCD may stabilize their joints in order to decrease both the complexity of the movement and the need for continued monitoring. This fixating may contribute to their generally awkward appearance and increases the time to respond appropriately to movement demands from their environment. (Missiuna 1994.)

It is proposed that children with DCD benefit less from improvement in skill development resulting from maturation and more from practice of a special skill. Still, these children have received only limited educational attention in relation to other types of handicapping conditions. One possible reason for this is that the nature and incidence of DCD in the general school population in Finland has not been described in a direct, systematic manner. However, much information and ideas about children with DCD come from studies where clumsiness is a primary consideration in clinical and special school settings. (Keogh et al. 1979.)

Finally, Gubbay (1975a) argues that being clumsy is relative to what is expected as individuals change and cannot be identified in terms of fixed or absolute criteria.

2.3.3. Concomitant problems

DCD may occur as an isolated phenomenon, but the motor development problems early in the school years often extend to cognitive and social-emotional areas (Cermak, Trimble, Coryell & Drake 1990; Geuze & Borger 1993; Losse et al. 1991; Schoemaker 1992, 29) Children with DCD develop lifestyles that may put skill development and social

interaction at risk, although this may only be the case for the most severely affected children (Cantell et al. 1994) .

Adolescents with stable motor problems seem to have fewer social hobbies and pastimes and have lower academic ambitions for their future (Cantell et al. 1994). They also believed they were less competent physically and academically (Cantell et al.1994; Losse et al.1991). Without fundamental motor patterns, (such as throwing, catching, kicking and hopping) children may experience a high failure rate both in school and playground. This results in lack of participation in sport (Larkin & Hoare 1991), avoidance to participation in structured physical activity, withdrawal from activity in unstructured settings (Thompson et al. 1994; Bouffard, Watkinson, Thompson, Dunn & Romanow 1996) and finally lack of physical fitness (O'Beirne et al. 1994). A child, who has not developed adequate fundamental movements may exhibit social isolation and loss of self-esteem and, as a result, a lower self-concept and poorer social development (Gallahue & Ozmun 1997, 402; Reid 1987; Williams 1983).

Some parents have considered the school's lack of concern about the child's motor difficulties to be a major determinant of behaviour problems, which were severe enough to result in temporary placement in a special school (Losse et al. 1991).

2.3.4 Persistence of coordination difficulties

The literature on DCD in later childhood or adolescence offers different, sometimes contradictory, views on how persistent the problems of coordination are. Many follow-up studies have shown that about half of the children remained clumsy well into the adolescent period (Geuze & Börger 1993; Losse et al. 1991; Lyytinen & Ahonen 1989). Cantell et al. (1994) found out that children, who were diagnosed at age 5 as having delayed motor development and the control group still differed in motor performance 10 years later.

As already indicated, proficiency in motor skills is characterized by purposeful, planned, and precise behaviour. However, acceptable proficiency varies with the person's age,

gender, and sociocultural environment. How acceptable proficiency is defined will depend on the particular theoretical perspective of those involved.

'Mild' motor problems do not improve spontaneously, and they are very resistant to treatment, at least in the short term. Early intervention can lead to significant improvements in gross motor development. Preschool children with learning disabilities made significant gains in motor performance when placed in structured program (Rimmer & Kelly 1989). Where there was direct, repetitive training of a specific skill, the treatment had a clear and strong effect (Polatajko et al.1995). Still, motor skills acquired in training settings are of little value to the children with disabilities unless they can be generalized as functional skills in natural community environments (Auxter 1983).

3. ASSESSMENT IN PHYSICAL EDUCATION

3.1. Assessment - what is it?

Assessment can be defined as collecting and interpreting relevant information about an individual to help make valid, reliable and non-discriminatory decisions (Gallahue 1993, 26; Seaman & DePauw 1989, 131; Sherrill 1998, 121; Ulrich 1988). Assessment and evaluation can be considered as synonyms, although some authors specify that assessment is a broader term (Burton 1997; Salvia & Ysselduke 1995). Assessment is a multifaceted process and an important aspect of any physical education program. There exists numerous purposes for assessment in general in physical education, but in adapted physical education primary purposes are screening, indentifying unique needs, instruction and placement (Dunn 1997, 121; Gallahue & Ozmun 1997, 489; Horvat & Kalakian 1996,1; Short 1995, 45). Assessment also helps teachers to recognize progress of a child. The purpose of assessment, however, *is not* to determine the root causes of difficulties or to generate labels (Werder & Kalakian 1985, 17).

Many tests have been claimed to be usable in assessing the effectiveness of physical education programs (Werder & Kalakian 1985, 5), but no evidence supports this contention, however. Because the transfer from one skill to the next is limited, the use of scores to evaluate the quality of a program could be viable only if the skills in the test were taught in the program, and no good program would concentrate on such a limited number of activities. Many motor skill tests are useful in screening tools, but for use as before-and-after tests to assess progress over a period of time in general motor performance, they have little value. (Fait 1983.) Direct assessment of abilities is usually not possible.

3.2. Fundamentals of the evaluation and measuring process

Evaluation is the use of information to reach a decision. The whole evaluation process should include evaluation of physical and motor abilities, fundamental and applied motor skills, knowledges and understandings, and values and attitudes as related to the physical education curriculum for that level of schooling. (Klesius 1981, 17-18.) The measurement

portion of the evaluation process involves tests, surveys and scales to collect information concerning students. Measurement instruments must be valid, reliable and objective. Furthermore, they should be standardized, economical in the equipment required, practical in the time needed for administration and discriminate among different levels of performance. (Horvat & Kalakian 1996, 26-28; Klesius 1981, 17.) The essential criteria for a useful test is that it demands minimal manpower, training and resources for employing the test. Every available test, published or unpublished, should be accompanied by a manual that fully describes the development and application of the test, instructions for test administration, and procedures for scoring and summarizing test data. (Katoff & Reuter 1980.)

A key strategy for a teacher implementing the measurement and evaluation process in a school program of adapted physical education is to phase the test areas. The first areas to be included in the evaluation process should be fundamental motor skills and motor and physical fitness (Laszlo & Bairstow 1985, 59). Assessment of the students with disabilities requires additional factors to be taken into account other than those generally considered in the regular physical education program evaluation process. Before students perform a test item they must understand the directions for completing the task. A person with disabilities may require additional warm-up and practice trials. Also motivating a child with disabilities to perform a test item may require different motivational techniques than are used with other students.

The most important consideration is that evaluation for physical education programming placement decisions for the children with disabilities must be in relation to their peers without disabilities. Because of the heterogenity in the ages and degrees of disabilities of children, an understanding of unique characteristics of these children and their interaction with motor performance is the first step in initiating the assessment process (Werder & Kalakian 1985, v).

3.3. Motor assessment

3.3.1. Approaches to motor assessment

Riggen, Ulrich & Ozmun (1990) have identified three different approaches existing in the area of motor performance assessment. One approach is concerned with identifying the achievement of motor milestones through the administration of a developmental scale (Bayley 1969; Folio & Fewell 1983). In the case of preverbal infants, assessment is possible only through the observation or measurement of motor behaviour. Another approach to assessment aim to identify general strengths and weaknesses within the motor or perceptual-motor domain by administering a highly structured motor ability test that has been standardized on a representative sample of individuals (Bruininks 1978; Stott, Moyes & Henderson 1972). The third approach to assessment concentrates on identifying skills that need additional instruction by assessing performance on specific culturally normative motor tasks (e.g. jump, kick, throw) (Hughes 1979; Loovis 1979; Ulrich 1985).

Many types of assessment with different types of tests and standards are used in physical education. Assessment instruments are characterized by great variability in content, difficulty and format of test items. Therefore, P.E.teachers are confronted with several issues in their efforts to select the best procedure for evaluating the motor performance.

3.3.2. Formal and informal assessment

Formal assessment is data collection in which children are aware that they are being tested or observed. Typically the tester explains the purpose of the test and encourages to do the best efforts. When the individual executes the desired motor skill, the teacher assigns a score to the one's performance according a to the scoring procedure. Formal assessment requires that test directions are followed precisely to ensure generalizability to results of others. (Horvat & Kalakian 1996, 49; Sherrill 1998, 122.)

Informal assessment instruments can be used to gather information about individual's functional capabilities in natural elements. This type of assessment allows the tester to collect information regarding performance from natural settings, that may be conducive to

developing the formal program plan. In many cases, informal assessment may be more suitable for children with physical, emotional, intellectual or sensory impairments than formal ones. (Horvat & Kalakian 1996, 49).

3.3.3. Product and process assessment

Product oriented tests measure the quantitative aspects of motor performance and focus on the outcome or end result of a particular performance. Traditionally, the product is a numerical measure, tests yield scores expressed as points, meters, seconds, kilograms or frequency counts. The result is quantative statement of performance. Product evaluation is helpful in obtaining an overview of the children's ability to perform specific motor tasks and for comparing children. A *process oriented* test indicates the student's level of performance. As a result of this type of test, a student would be judged, for example, as exhibiting a stage 2 level of skill for performing a standing jump for distance. This is a qualitative statement of performance. The vast majority of instruments fall into the first category (Ulrich 1983). To accurately and completely measure an individual's level of performance a combination of product results and process information must be collected. (Dunn 1997, 137-138; Gallahue 1993, 226; Gallahue & Ozmun 1997, 490; Sherrill 1998, 123.)

3.3.4. Norm-referenced and criterion-referenced assessment

The general motive for testing a child is to evaluate his behaviour with reference to that of a comparable group of children. This type of test in which the performance of a child is directly compared to that of other children is called a *norm-referenced* test (e.g. Bruininks 1978). Norm-referenced means that an assessment instrument has been administered to several hundreds of persons and that statistics of chronological age groups and gender are available (Sherrill 1998, 123). These test standards procedures are of singular importance (Laszlo & Bairstow 1985, 61). In addition to the comparison of children, norm-referenced tests are helpful in screening for motor problem and in program evaluation. However, the tester must be cautious when generalizing the results beyond the population on which the

norms were generated. (Dunn 1997, 137; Gallahue & Ozmun 1997, 489; Sherrill 1998, 123; Short 1995, 45.)

When a teacher wants to record an individual's competence or behaviour rather than make a comparison with other individuals, a *criterion-referenced* type of assessment is useful. This type of test have the basis for reference in a specific set of actions. The usual format is either a checklist, task analysis or a set of behavioural objectives. The usefulness of a test depends on the way in which various activities are categorised, and in how representative are the items within a category. Criterion-referenced testing is intended to help the children master specific skills. In this role the criterion-referenced test can be used to find out the capabilities of a child prior to instruction, to measure ongoing progress of learning, and to identify and diagnose the causes of possible learning difficulties (Fuchs & Fuchs 1984; King & Aufsesser 1988). This test has proven useful also in situations to classify people regarding their competence for some defined task - for example entry to specialized instruction for the handicapped (King & Aufsesser 1984), or assessing employment skills (Wasburn & Safrit 1982).

3.3.5. Selecting an assessment instrument

The type of test that is selected for an assessment must depend primarily on ones's motive for assessing a child, but also on the level at which one wishes to assess behaviour. (Laszlo & Bairstow 1985, 61.) Sheehan & Keogh (1981) stress that commonly used developmental tests provide only relatively gross summarizing scores, not fine grained clinical data. Because the rate of growth is slow and inconsistent for many children with handicap and the magnitude of treatment effects is small, developmental test data may not adequately document change in children. Therefore summary scores from standard developmental tests may be weak data for demonstrating program impact when used within a pre- and post-test design (favored in the education science models of evaluation). (Sheehan & Keogh 1981.)

Also the statistical procedures are necessary for norming of a test and for establishing a test's reliability and validity. Validity of measurement indicates the degree to which the

test, or instrument, measures what it is supposed to measure. Thus, validity refers to the soundness of the interpretation of a test, the most important consideration in measurement. Most of these tests have been evaluated for construct validity based on the fact that those with low motor skills usually score lower on motor skill tests than those with more proficient motor skills. (Horvat & Kalakian 1996, 31-42; Fait 1983.)

When assessing motor ability, specific motor skills that are the foundation of effective motor performance are measured. A very effective measuring device for evaluating basic motor skills is the behavioral objective, which presents the skill to be learned in terms that make possible easy determination of whether the skill has been accomplished.

5. TEACHER AS AN OBSERVER

As a result of the scarcity of information on testing individuals with disabilities in the adapted physical education and physical education, adapted physical education teachers may not be adequately trained in measurement, while physical education teachers usually have only a cursory amount of information about the children with disabilities. Further, elementary or special education teachers may be completely lacking in knowledge about assessing the physical and motor performance of these individuals. Most teachers who employ a standardized motor assessment instrument have only received informal training (Ulrich, 1985b). In most cases the testers in studies are very familiar with motor assessment in general (Riggen et al. 1990).

One of the findings of a survey by Baumgartner and Seaman (1985) was that exercise psychologists, measurement specialists, and adapted physical education specialists were not in agreement concerning fitness testing of individuals with disabilities. Since these speciality areas cannot agree on the instrument or component of fitness, it has been difficult to develop appropriate tests. (Baumgartner & Horvat 1988.) Although fitness testing is a different area of the assessment the results reflect the difficulties in assessing individuals with disabilities.

Teachers must have an understanding of the motor skill level at which students in their classrooms should be functioning (King & Dunn 1989). Selecting a test in the motor domain requires that the test items cover a wide range of performance traits. Fuchs, Fuchs & Warren (1982) found out that special educators formulate criterion referenced decisions primarily on the basis of unsystematic observation rather than on the basis of assessment data. Although they do not gather student performance data systematically, teachers express confidence in the accuracy of their criterion-referenced judgements.

However, additional study (Fuchs & Fuchs 1984) suggest that the confidence teachers place in the accuracy of their observations may not be well founded. Although teachers recognized when objectives actually had been achieved, they failed to judge accurately when objectives were not met. Despite this accuracy teachers said that they were sure of their assessments. Nevertheless, the actual reliablility of such judgements remain unclear.

Teacher experience has been noted not to affect the accuracy of assessments but appeared to make the experienced teachers more confident in their estimates (Fuchs & Fuchs 1984).

Results of a survey of physical education instructors who were responsible for motor assessment and instruction involving students in special education programs indicated that the motor ability type of test is the most popular for determining eligibility to receive adapted physical education services (Ulrich 1985b). The tests currently in use have predominantly been developed to discriminate among students as a means of identifying motor problems. (Riggen et al. 1990.)

Generally, teachers are not well trained in issues of motor development and consequently they find it difficult to make detailed judgements of their pupil's performance (Lam & Henderson 1987). When teachers had a special interest in children with difficulties and, moreover, were used to observing their pupils' behaviour systematically, their ratings and judgements proved to be very accurate (Henderson & Hall 1982). Special educator, who is familiar with evaluation options has the best chance of making reasoned desicions at the operational level (Sheehan & Keogh 1984).

Gudmundsson (1994, 42-44) found out that mothers were generally accurate in their estimates of verbal development, but inaccurate in their estimates of achievement and gross motor development. Preschool teachers, on the other hand, were found to be more accurate in their estimates concerning motor domains than in those concerning verbal ones.

5. PURPOSE OF THE STUDY AND RESEARCH PROBLEMS

The general aim of this study was to consider whether clumsiness would be identified with any concistency by different educators. Moreover, the purpose of this study was to investigate primary school teachers' and physical education teachers' (working in secondary schools) accuracy in assessing children's gross motor development with a test instrument. The additional goal was to introduce the possibilities of qualitative assessment of gross motor abilities to physical educators in Finland. Traditionally, physical education teachers have not used this type of assessment. The performances of children have usually been measured with seconds and centimetres, in comparison with normative data. Qualitative criterion-based assessment is not just a method to assess the superiority or inferiority of children but also a way to provide evidence of meeting the objectives of physical education.

Research problems

The following reseach questions were addressed in this study:

1. What is the teachers' accuracy in assessing gross motor performance?
   1.1. How much do the assessed performance scores differ from the true score?
   1.2. Do the scores differ by profession?
   1.3. Do the scores differ by sex?
   1.4. Do the scores differ by teacher experience?
   1.5. Do the scores differ by age?

2. What is the inter-scorer reliability?

3. What are the experiences of the teachers after using the TGMD?

4. What is the relationship between the experienced difficulty and the accuracy of scoring?

The hypotheses of the study

The following hypothesis are based on the reviewed literature and the practical experience of the teacher.

1. The performance ratings (scores) of physical education teachers differ from the true score less frequently than the ones of primary school teachers.

2. The more experienced teachers have more accurate scores.

3. The number of deviations from the true score do not differ by sex.

4. Teachers experiencing the performance scoring easy do have more accurate scores (closer to true score) than teachers who experience scoring difficult.

6. METHOD

6.1 Test of gross motor development

The Test of Gross Motor Development (TGMD), developed by Ulrich (1985) is a comprehensive test involving everyday motor skills. It is supplied with normative data and it has been proved easy to administer. The test is a mean of assessing fundamental movement skills in children from three to ten years of age. Selected locomotor and object control skills comprise the twelve item test. Locomotor skills include running, galloping, hopping, leaping, horizontal jumping, skipping and sliding. Object control skills include striking, ball bouncing, catching, kicking and overarm throwing.

For each skill the tester is provided with an illustration, equipment and condition requirements, directions and performance criteria (Appendix 1). Children receive one point for meeting each of the performance criteria given. The performance criteria is met, if the subject performs two out of three trials correctly.

Administration of the TGMD takes about fifteen minutes per child. Both test-retest realiability and interrater reliability scores are high (Ulrich & Wise 1984). Additionally, the validity of each item has been established. TGMD provides both norm-referenced and criterion-referenced interpretations for each fundamental motor skill and can be used as a device for between-individual and between-group comparisons, as well as for within-individual comparisons.

6.2. Research design and procedures

Subjects

Fifty-two teachers, 26 of them teaching physical education in primary schools and 26 physical education teachers (teaching in secondary school) participated in the study. The videotape was presented to 52 teachers to score the performances. There were 22 female (42 %) and 30 male (58 %) teachers. The majority (58 %) of the teachers were between 31

to 40 years of age. The more accurate description of the subjects is presented in Appendix 15.

Materials

One special school in Lahti was selected for this study. Thirty children, described as having moderate learning difficulties or dysphasia were tested twice with the TGMD in spring 1993. The children were from 7 to 12 years of age and represented a wide range of motor development. The TGMD was administered by the author and the test performances were videotaped by three trained school assistants. The performances were analysed and scored frame by frame by two experts. They were thoroughly briefed on the nature and contents of the tapes. Their ratings were used in this study as a *true score*. Then a videotape was edited to have each gross motor skill presented by four *different* children. Each child performed three trials, as instructed in TGMD administration procedures. An effort was made to construct a videotape where the performances represent well the different aspects of gross motor patterns.

Procedures

The videotape was presented to subjects. They were asked to observe and score the children's motor performances and concentrate on the performance criteria on 12 different items of the TGMD. Prior to scoring the performances, the test item directions and scoring procedures were introduced to subjects in a session lasting approximately one hour. To establish a mental picture of a mature performance the subjects were instructed to view the illustrations provided for each motor skill and to practise the scoring. Scorings were compared with the true scores. The subjects were also asked to answer the questionnaire (Appendix 2).

Data analysis

Different statistical methods were used to solve the research problems. The data was organised to frequency distributions and to percentual distributions in order to analyse it. To investigate the statistical differences between two groups the contingency tables and chi

square -tests were used. The statistical differences between groups are expressed as follows:

$p < 0.05$	= almost significant	(*)
$p < 0.01$	= significant	(**)
$p < 0.001$	= very significant	(***)

The differences of means were examined with the t-test and one-way ANOVA (analysis of variance). Also the correlation coefficient was used.

Reliability and validity

An attempt was made to prepare the videotape and the questionnaire as carefully as possible. The pre-testing of the videotape was made with five teachers watching the videotape several times and giving comments about it and the criteria. The criteria were derived from the TGMD. It is a standardised test with high validity and reliability.

In this study, the author gave the instructions and trained the subjects in every session. The reliability of the questionnaire was calculated to the questions, which measured the opinions about scoring the performances (questions from 15 to18 and from 20 to 24). Reliability was satisfactory (= 0.64) after the question 16 been rejected (Appendix 3). Before that the item-analysis indicated that the reliability was not sufficient for a questionnaire to be functional (Yli-Luoma 1996, 67-70). Prior to using the statistical methods the direction of the variables from 15 to 18 was changed in order to have positive correlations.

7. RESULTS

7.1. Teacher scorings compared to the true score

Teachers' scores were compared with true scores (ratings made by two experts). The number of the deviations of a teacher varied between 25 and 58 . The total number of the scorings was 180. The number of deviations from the true score was divided into seven classes. The classes were more useful when statistical methods were utilized (Appendix 4).

The physical education teachers working in secondary schools had less deviations from the true score than the primary school teachers (Figure 2, Table 2). By t-test a significant difference ($p < 0.01$) was found between these two groups (Appendix 5).

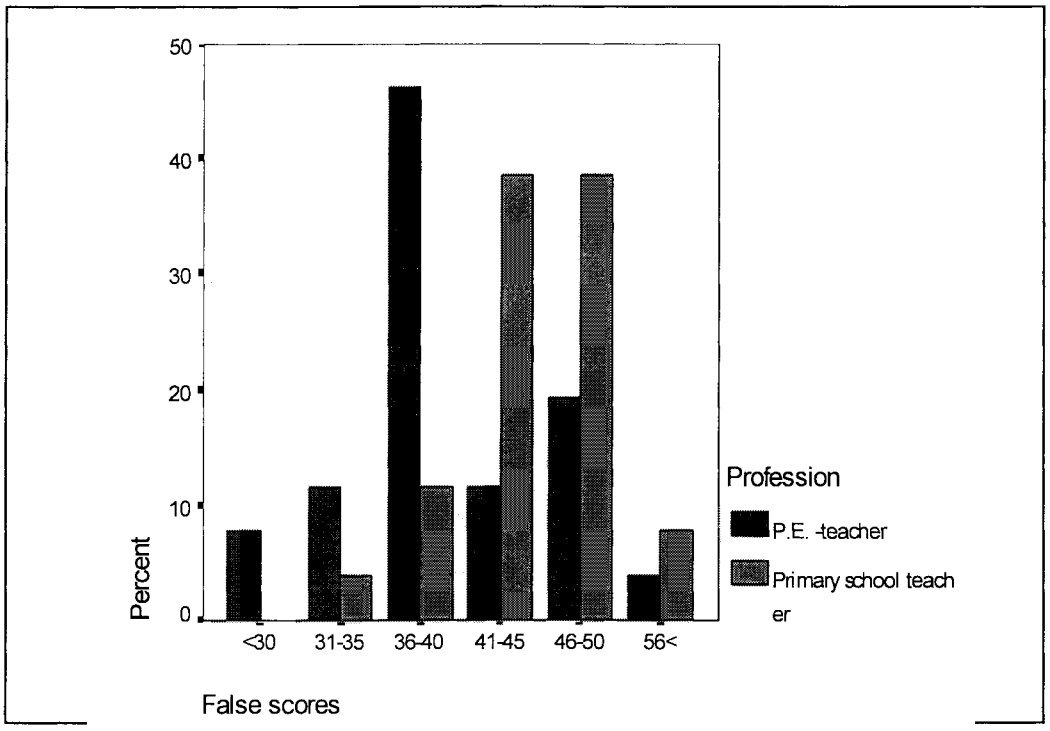

FIGURE 2. Deviations from the true score according to profession

TABLE 2. The total number of the correct scores

Profession	Locomotor scores (n = 2704)		Object control scores (n = 1976)		All scores together (n = 4680)	
	n	%	n	%	n	%
P.E. teachers	2170	80	1465	74	3635	78
Primary school t.	2041	76	1409	71	3450	74

Teachers with longer teacher experience had no more accurate scores compared with teachers with less experience. With t-test, no significant differences between these two groups were found. There were neither any significant differences between teachers of different age. Obviously, age and teacher experience are closely related to each other. When the deviations from the true score were compared to sex, no statistical differences were found (Appendices 6, 7 and 8).

7.2. The inter-scorer reliability

The observers are said to be in agreement if they concur in the scoring of performance criteria on their observations. Percentage of agreement between observers was calculated as the number of agreements divided by the number of agreements plus disagreements. The inter-scorer agreement for all the skills was 0.75 in primary school teachers and 0.78 in physical education teachers. The sum of the observed raw scores varied between 83 and 130, the standard deviation was 12.2 and mean 106.9. The sum of the true raw score was 109 (Appendix 9).

7.3. Opinions about the performance scoring

More than the half of the teachers (56 %) stated there were too many performance criteria to follow at the same time. However, 31 % of teachers were thinking just in the opposite way. In this sense, some differences between physical education teachers and primary

school teachers were found, but not significant (p = 0.061) (Appendix 10). Also more than the half of the teachers (54 %) thought it was easier to score when the performance illustrations were provided with the general introduction in the training session (Table 3).

TABLE 3. Teachers' opinions about the TGMD

Statement	Opinion (%)				
	Agree	Slightly agree	Cannot say	Slightly disagree	Disagree
Criteria open to interpretations	23	33	0	44	0
Video easier than live scoring	39	52	6	4	0
Excessive number of criterion	4	56	10	31	0
Illustrations helpful	15	54	6	19	6

29 % of the teachers said that they had often difficulties to remember the performance criteria when watching the videotape, 31 % had problems sometimes and 37 % seldom. A significant difference between sexes was found in this sense ($p<.01$). Male teachers thought it was not so difficult to remember the criteria. However, the accuracy of their scores was not any better compared to females (Appendix 11).

Following of many criteria at the same time was often difficult for 44 % of teachers and sometimes for 33 % of teachers. An almost significant difference ($p < .05$) between physical education teachers and primary school teachers was found (Appendix 12). Both of the teachers experienced difficulties in desicion-making whether the criterion is met or not. Almost half of them had difficulties at least sometimes. There were no significant differences between different groups. Videotape can be assumed to be quite well prepared, because 62 % of teachers said that in any situation there were no difficulties to see criterion because of the angle of the view (Table 4).

TABLE 4. Teachers' difficulties in different matters connected to TGMD

Difficulty	Opinion (%)				
	Never	Seldom	Sometimes	Often	Always
To remember the criteria	4	37	31	29	0
To observe many criteria	0	23	33	44	0
To score pass or fail	0	15	60	14	12
To decide if accomplished	0	35	48	17	0
To observe on certain angle	62	29	6	0	4

7.4. Experienced difficulty and the accuracy of scoring

The teachers were asked to give an opinion of how difficult it was to assess the motor performances from a videotape. The answers to this question are presented in Table 5.

TABLE 5. The experienced difficulty of the assessment of performance

The experienced difficulty	Frequency	Percent
Easy	1	2
Moderate easy	10	19
Moderate	22	42
Moderate difficult	16	31
Difficult	3	6
Total	52	100

The answers were compared to the number of deviations with the test of correlation. The latter correlated with each other in almost significant level (Appendix 13). In crosstabulation some differences were found between groups, but the differences were not significant.

Teachers were asked what was the easiest and the most difficult skill to score (Appendix 14). The results were compared with the deviances from the true score in order to get more information.

The easiest locomotor skill was found to be slide (Figure 3). 54 % of the teachers thought this skill was the easiest one to score. Some of them said that there were not so many criteria, even when there were four of them. When the deviation from the true score is examined, it can be noticed that the least deviations are in this skill. 88 % of scores are equal with the true score.

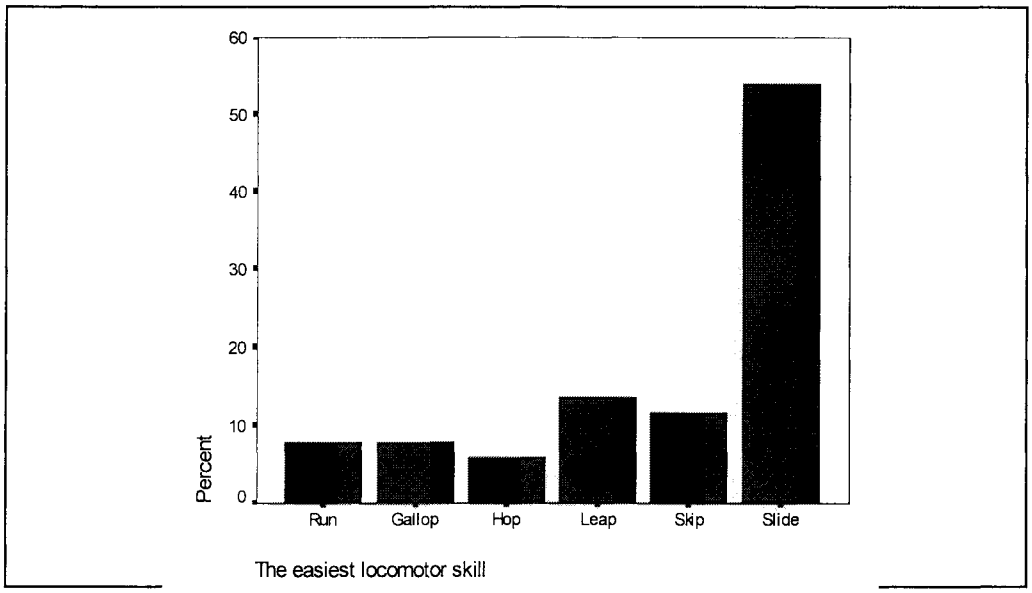

FIGURE 3. The easiest locomotor skill to score according to teachers' experiences

According to teachers' opinions the most difficult locomotor skill to score was horizontal jump (58 %) (Figure 4). When the deviations from the true score were examined it was found that the most deviations are, however, in leap (69 % correct scores) and in skip (70 % correct scores). It is interesting to notice that 80 % of the performance scores of the teachers in horizontal jump are equal with true score.

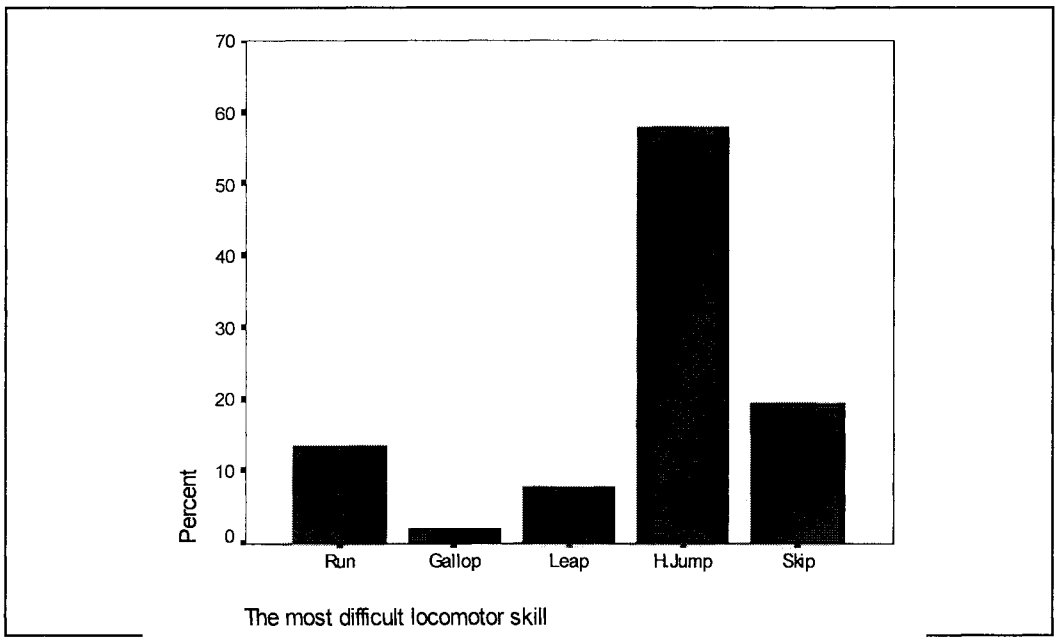

FIGURE 4. The most difficult locomotor skill to score according to teachers' experiences

The easiest object control skill to score was catch (the opinion of 50 % of teachers), on the other hand, almost the same percentage of teachers (42 %) stated stationary bounce as the easiest to score. These two skills were clearly the easiest ones to score (Figure 5). When compared to deviations from the true score it can be noticed that in these two skills does also exist the most frequent number of correct scores (stationary bounce 80 % and catch 77 %).

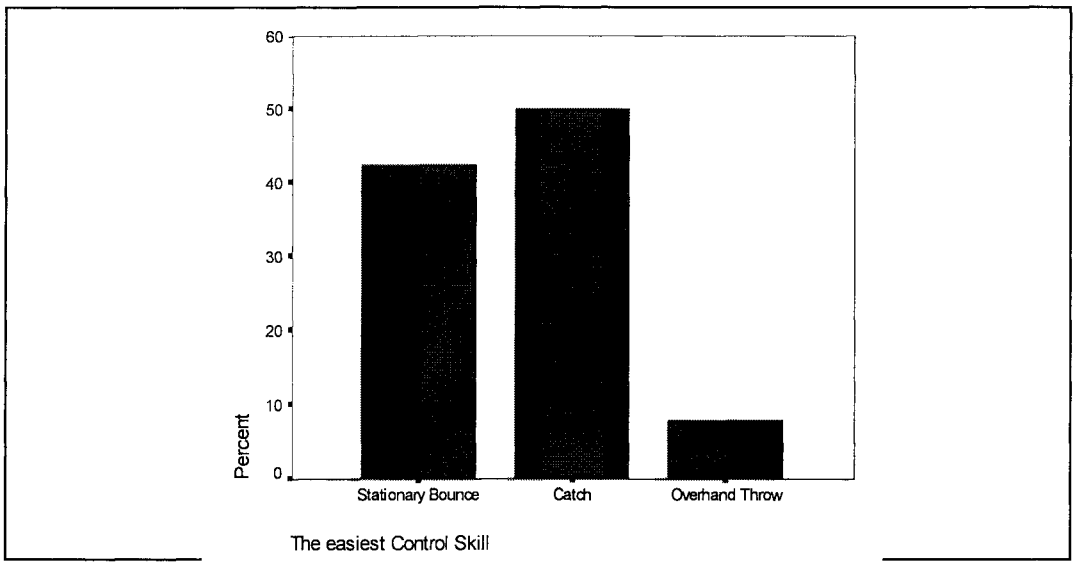

FIGURE 5. The easiest object control skill to score according to teachers' experiences

Clearly the most difficult skill to score was kick, only 56 % of the teachers supporting the statement (Figure 6). Also the most of the deviations from the true score were found in this skill. Only 58 % of the scores were equal with the true score.

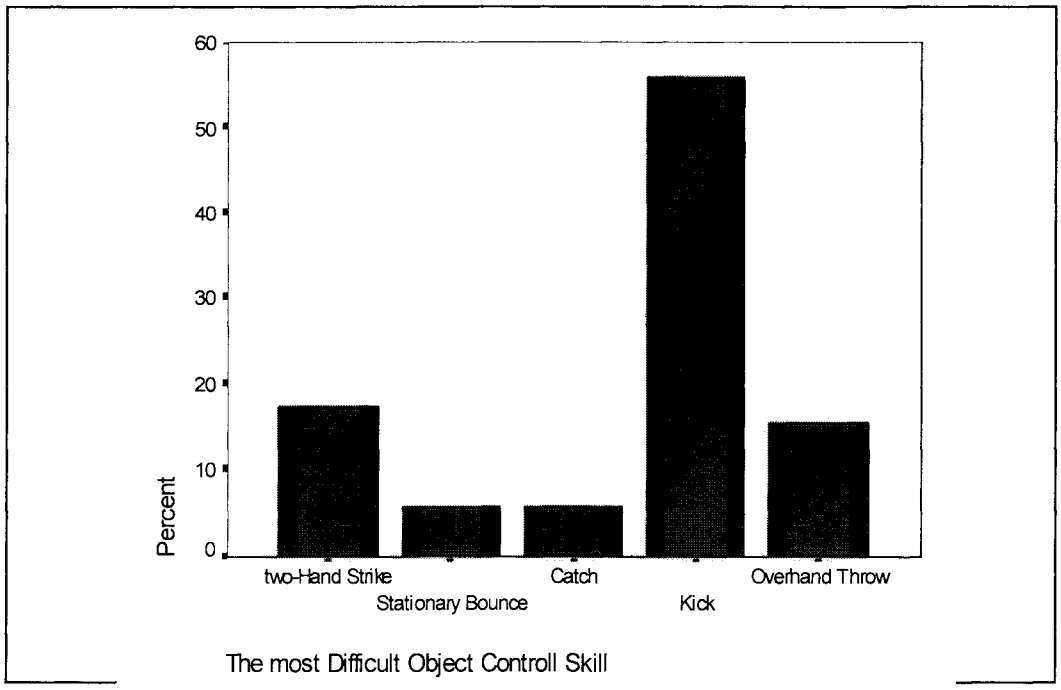

FIGURE 6. The most difficult object control skill to score according to teachers' experiences

8. DISCUSSION

The purpose of this study was to examine the teachers' accuracy in assessing children's motor performance. Here interpretations are made by comparing the results to the hypotheses stated in chapter 5.

The teachers who teach physical education in primary schools are in great importance when screening students having unique physical and motor needs. In general, the results of this study suggest that the professional physical education teachers are more competent in assessing the gross motor performance of children compared to primary school teachers. This is consistent with the hypothesis. The difference in teachers recognising clumsy students has been reported to be a function of their training and the criteria of identification (Maeland 1992). The P.E.teachers are introduced the methods of assessment early in their studies, while primary teachers are given a broad overview of the developmental evaluation. Also the teacher training differences in the area of adapted physical education in Finland may explain the finding. In their profession, the physical education teachers in secondary schools are more often in situations, where they can observe their students in motion. Primary school teachers teach most of their subjects in a classroom, where fine motor tasks are more apparent.

The age and the teacher experience did not seem to have a statistically significant inluence to the accuracy of scorings. The hypothesis of teacher experience was not supported. Perhaps the random selection of subjects offer a biased view of the age and experience of the whole population of teachers. Yet, the majority of the teachers in this study were not even in the age of 40. Still, teaching experience have been reported to make the experienced teachers more confident in their estimates (Fuchs & Fuchs 1984).

Instead, the third hypothesis was supported. The results of this study indicated that there were no significant differences between male and female teachers in the deviations from the true score. The same kind of teacher training do not give advantages to either male or female teachers. Additionally, when the groups in physical education are more often mixed, both teachers are able to see girls and boys on the move.

The inter-scorer reliability, objectivity, was found to be lower compared to other studies. The agreements in this study were 0.75 (primary school teachers) and 0.78 (physical education teachers). The assessment is considered adequate if the inter-scorer reliability is at least 0.80 (Horvat & Kalakian 1996, 41). In the pilot inter-scorer reliability study of TGMD (Ulrich & Wise 1984), the estimated generalizability coefficients varied between .86 and .97 (independent ratings of 20, 10 and 2 raters).

What factors explain the extent of variability in performance scoring? Most of the teachers expressed the performances were at least moderately difficult to score. This may reflect the lack of systematic training to use the performance criteria typical for criterion-referenced testing as a reference when assessing students gross motor skills. Besides, the opportunities to observe children with developmental motor problems in P.E. lessons may also be less frequent, because the clumsiest children in the entire population probably had been excluded from most ordinary schools. On the other hand, nearly one third of the subjects did not consider the scoring particularly problematic. All the same, the perceived difficulties did not correlate significantly with the accuracy of ratings.

If the teacher is not well acquainted with the basic locomotor and manipulative skills prior to scoring situation, it can be assumed that it can be difficult to remember the performance criteria during the videotape session. Not surprisingly, this was also the opinion of most teachers after the video session. Subjects were instructed to read the criteria of each skill before the performance and they were allowed to have a look to skill illustrations during the watching. The teacher training period for this study may have been too short, although nearly all of the teachers considered the preparation of the subjects adequate and thorough. Besides, time consumed on the training is in less importance compared to the content of the training.

Over three quarters of the teachers supported the statement of the excessive number of criteria to follow at the same time. Even though the number of criteria in each skill was either 3 or 4, some criteria were consisted of two or more movements of different body parts (e.g. criterion 2 in run or criterion 1 in horizontal jump, Appendix 1). This causes the increase of the number of things to be watched. Therefore it could also be more complicated for some teachers to decide whether the performance of a child according to

criterion was pass or fail.

In teachers' opinion, the easiest locomotor skill to score was slide and the small number of errors in the skill support this statement. The criteria in this skill were unambigious. By contrast with that, the most difficult locomotor skill experienced and actually scored were not the same ones (horizontal jump and skipping). Although the mature motor skills were presented to teachers from videotape prior to scoring session, the mental picture of skipping may have been less consistent in mind. This may be due to the criterion "rhytmical repetition", which was present only in this skill. It can be confusing when an otherwise correct pattern of movement is performed intermittently.

The easiest (catch and stationary bounce) and the most difficult object control skills (kick) experienced to score were the same as the ones with the least and the most number of deviations from the true score. Linjala (1997, 53) have assumed that the cultural influences on the criteria of kick might make the assessment of this skill more difficult. The additional explanation may be the fact that the kick is also the only object control skill in TGMD where a skill performer is in motion ("rapid continuous approach to the ball"). The same justification was given by many teachers.

Maeland (1992) have critisized that different assessment methods identify a different set of clumsy children. There is also discussion whether there is any agreement among teachers in idenifying clumsiness. In this study, the identification of clumsy children was not a primary purpose.

The test situation was constructed to avoid the influence of environment. Still, it is hazardous to make generalizations of the teachers abilities based only on this kind of study. The motor performances can be measured in different ways and from different perspectives. Rather than a composite score, a profile of the individual's performance should be given to detect strengths and weaknessess in the motor area. However, these data do provide an additional step in examining the relationship between the observational accuracy of teachers teaching physical education in different class levels, in a somewhat different frame of reference.

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APPENDICES

APPENDIX I

Specific Subtest Instructions and Illustrations

Subtest 1. Locomotor Skills

SKILL: Run

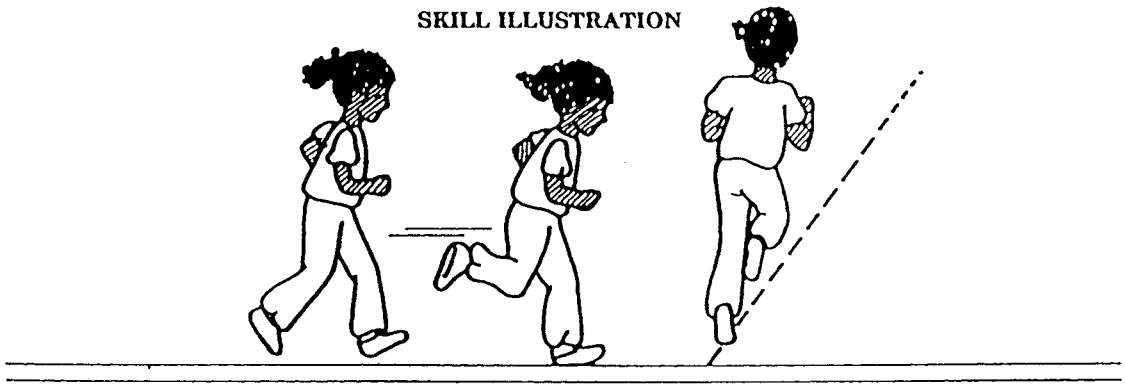
EQUIPMENT/CONDITIONS: A minimum of 50 feet of clear space and masking tape, chalk, or other marking device.

DIRECTIONS: Mark off two lines 50 feet apart. Instruct the student to "run fast" from one line to the other.

PERFORMANCE CRITERIA:

1. Brief period where both feet are off the ground.
2. Arms move in opposition to legs, elbows bent.
3. Foot placement near or on a line (not flat footed).
4. Nonsupport leg bent approximately 90 degrees (close to buttocks).

SKILL ILLUSTRATION



SKILL: Gallop

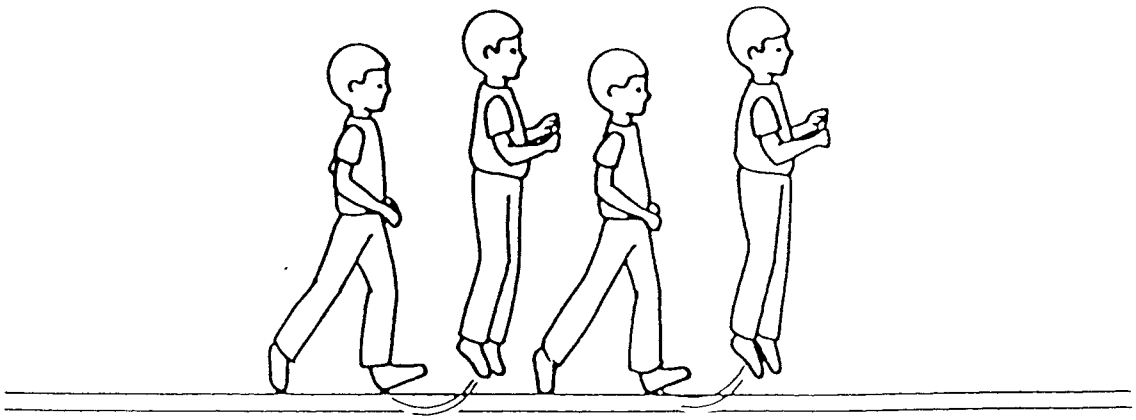
EQUIPMENT/CONDITIONS: A minimum of 30 feet of clear space.

DIRECTIONS: Mark off two lines 30 feet apart. Tell the student to gallop from one line to the other three times. Tell the student to gallop by leading with one foot and then the other.

PERFORMANCE CRITERIA:

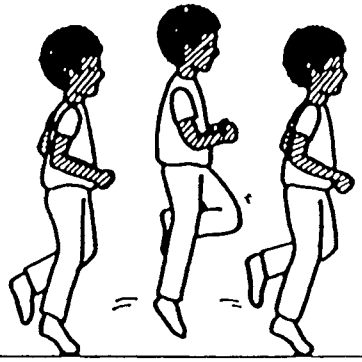
1. A step forward with the lead foot followed by a step with the trailing foot to a position adjacent to or behind the lead foot.
2. Brief period where both feet are off the ground.
3. Arms bent and lifted to waist level.
4. Able to lead with the right and left foot.

SKILL ILLUSTRATION



SKILL: Hop
EQUIPMENT/CONDITIONS: A minimum of 15 feet of clear space.
DIRECTIONS: Ask the student to hop three times, first on one foot and then on the other.
PERFORMANCE CRITERIA:
1. Foot of nonsupport leg is bent and carried in back of the body.
2. Nonsupport leg swings in pendular fashion to produce force.
3. Arms bent at elbows and swing forward on take off.
4. Able to hop on the right and left foot.*

SKILL ILLUSTRATION



*This criteria does not require the performance of the other three.

SKILL: Leap
EQUIPMENT/CONDITIONS: A minimum of 30 feet of clear space.
DIRECTIONS: Ask the student to leap. Tell the student to take large steps by leaping from one foot to the other.

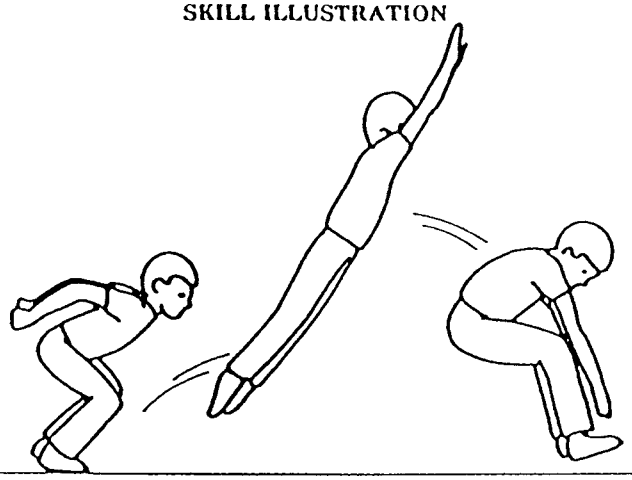
PERFORMANCE CRITERIA:
1. Take off on one foot and land on the opposite foot.
2. A period where both feet are off the ground (longer than running).
3. Forward reach with arm opposite the lead foot.

SKILL ILLUSTRATION

SKILL: Horizontal Jump
EQUIPMENT/CONDITIONS: A minimum of 10 feet of clear space and masking tape, or other marking device.
DIRECTIONS: Mark off a starting line on the floor, mat, or carpet. Have the student start behind the line. Tell the student to "jump far."

PERFORMANCE CRITERIA:
1. Preparatory movement includes flexion of both knees with arms extended behind the body.
2. Arms extend forcefully forward and upward, reaching full extension above head.
3. Take off and land on both feet simultaneously.
4. Arms are brought downward during landing.

SKILL ILLUSTRATION



SKILL: Skip

EQUIPMENT/CONDITIONS: A minimum of 30 feet of clear space and masking tape, or other marking device.

DIRECTIONS: Mark off two lines 30 feet apart. Tell the student to skip from one line to the other three times.

PERFORMANCE CRITERIA:

1. A rhythmical repetition of the step-hop on alternate feet.
2. Foot of nonsupport leg carried near surface during hop phase.
3. Arms alternately moving in opposition to legs at about waist level.

SKILL ILLUSTRATION

SKILL: Slide

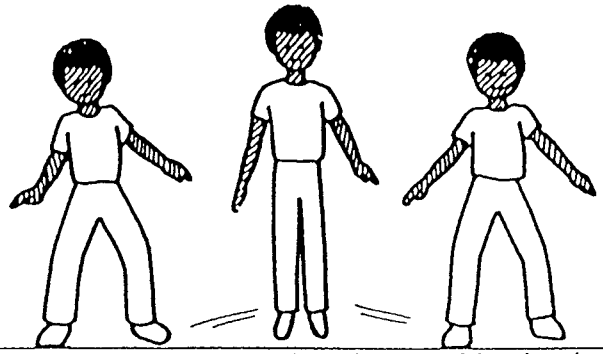
EQUIPMENT/CONDITIONS: A minimum of 30 feet of clear space and masking tape, or other marking device.

DIRECTIONS: Mark off two lines 30 feet apart. Tell the student to slide from one line to the other three times facing the same direction.

PERFORMANCE CRITERIA:

1. Body turned sideways to desired direction of travel.
2. A step sideways followed by a slide of the trailing foot to a point next to the lead foot.
3. A short period where both feet are off the floor.
4. Able to slide to the right and to the left side.*

SKILL ILLUSTRATION



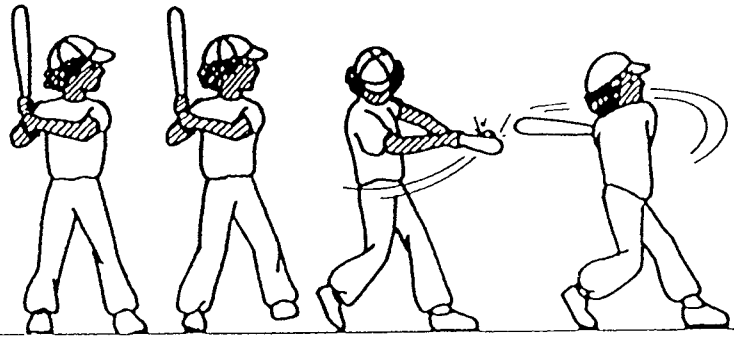
*This criteria does not require the performance of the other three.

Subtest 2. Object Control Skill Subtest

SKILL: Two-Hand Strike
EQUIPMENT/CONDITIONS: A 4-6 inch lightweight ball and a plastic bat.
DIRECTIONS: Toss the ball softly to the student at about waist level. Tell the student to hit the ball hard. Count only those tosses that are between the student's waist and shoulders.

PERFORMANCE CRITERIA:
1. Dominant hand grips bat above nondominant hand.
2. Nondominant side of body faces the tosser (feet parallel).
3. Hip and spine rotation.
4. Weight is transferred by stepping with front foot.

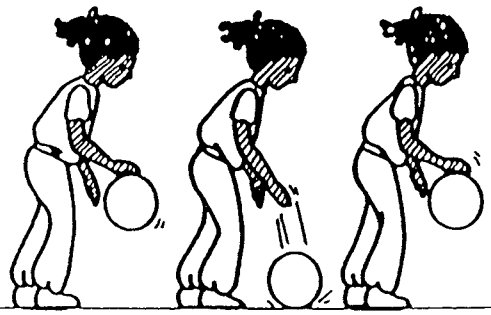
SKILL ILLUSTRATION



SKILL: Stationary Bounce
EQUIPMENT/CONDITIONS: An 8-10 inch playground ball and a flat hard surface.
DIRECTIONS: Tell the student to bounce the ball three times using one hand. Make sure the ball is not underinflated. Repeat three separate trials.

PERFORMANCE CRITERIA:
1. Contact ball with one hand at about hip height.
2. Pushes ball with fingers (not a slap).
3. Ball contacts floor in front of (or to the outside of) foot on the side of the hand being used.

SKILL ILLUSTRATION



SKILL: Catch

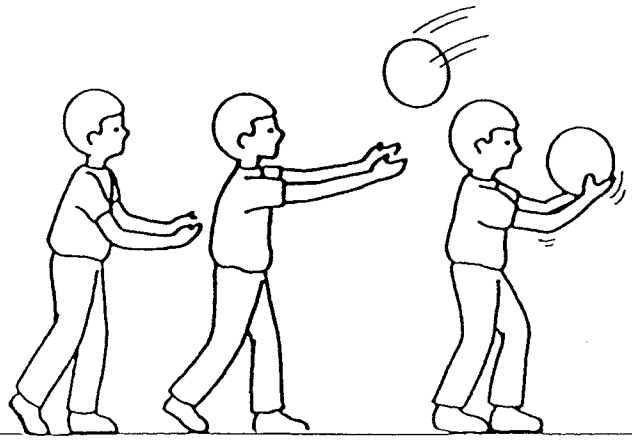
EQUIPMENT/CONDITIONS: A 6-8 inch sponge ball, 15 feet of clear space, masking tape or other marking device.

DIRECTIONS: Mark off two lines 15 feet apart. Student stands on one line and the tosser on the other. Toss the ball underhand directly to student with a slight arc, saying "catch it with your hands." Only count those tosses that are between student's shoulders and waist.

PERFORMANCE CRITERIA:

1. Preparation phase where elbows are flexed and hands are in front of body.
2. Arms extend in preparation for ball contact.
3. Ball is caught and controlled by hands only.
4. Elbows bend to absorb force.

SKILL ILLUSTRATION



SKILL: Kick

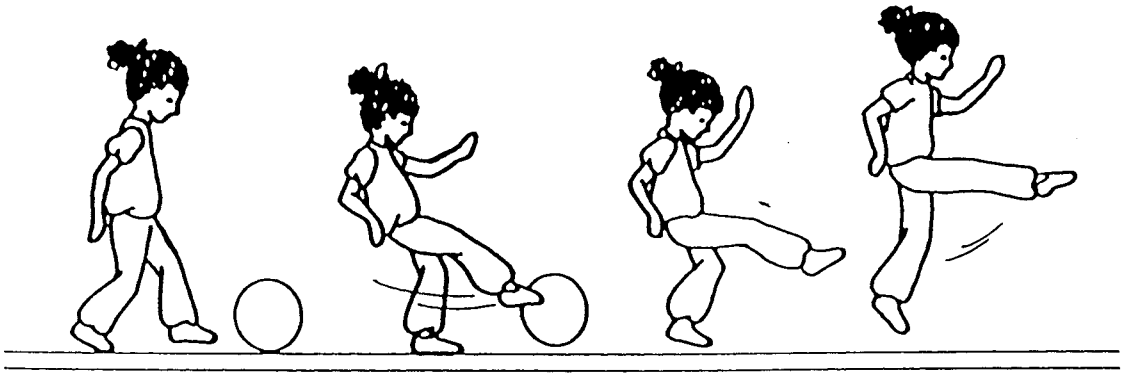
EQUIPMENT/CONDITIONS: An 8-10 inch plastic or slightly deflated playground ball, 30 feet of clear space, masking tape or other marking device.

DIRECTIONS: Mark off one line 30 feet away from a wall and one that is 20 feet from the wall. Place the ball on the line nearest the wall and tell the student to stand on the other line. Tell the student to kick the ball "hard" toward the wall.

PERFORMANCE CRITERIA:

1. Rapid continuous approach to the ball.
2. The trunk is inclined backward during ball contact.
3. Forward swing of the arm opposite kicking leg.
4. Follow-through by hopping on nonkicking foot.

SKILL ILLUSTRATION



SKILL: Overhand Throw

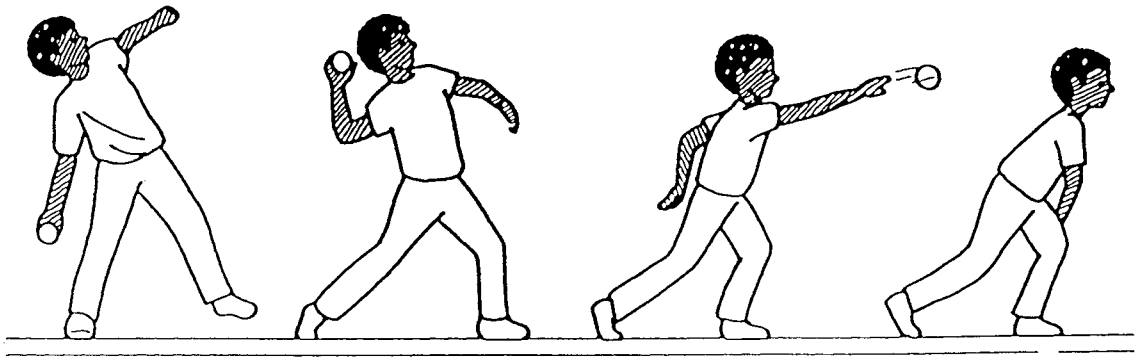
EQUIPMENT/CONDITIONS: A tennis ball, a wall, and 25 feet of clear space.

DIRECTIONS: Tell the student to throw the ball "hard" at the wall.

PERFORMANCE CRITERIA:

1. A downward arc of the throwing arm initiates the windup.
2. Rotation of hip and shoulder to a point where the nondominant side faces an imaginary target.
3. Weight is transferred by stepping with the foot opposite the throwing hand.
4. Follow-through beyond ball release diagonally across body toward side opposite throwing arm.

SKILL ILLUSTRATION



APPENDIX 2

QUESTIONNAIRE (Translated from Finnish)

Please tick the appropriate box.

1. Your sex:
   1. ( ) Female
   2. ( ) Male

2. Your age:
   1. ( ) Under 30
   2. ( ) 31 - 40
   3. ( ) 41 - 50
   4. ( ) Over 50 years

3. Your education:
   1. ( ) Sports instructor
   2. ( ) B.Sc. in human movement sciences
   3. ( ) M.Sc. in human movement sciences
   4. ( ) M.Sc. in pedagogy
   5. ( ) Master of physical training
   6. ( ) Other

4. How many years you have taught physical education in school?
   1. ( ) Under 5
   2. ( ) 5 - 10
   3. ( ) 11 - 20
   4. ( ) over 20 years

5. Your present post?
   1. ( ) Permanent
   2. ( ) Temporary
   3. ( ) Substitute
   4. ( ) Part-time
   5. ( ) Other

6. Do you work as a coach or a sports instructor after the school time?
   1. ( ) Yes
   2. ( ) No

7. How often do you do that?
   1. ( ) Less than once a week
   2. ( ) Once a week
   3. ( ) 2 - 3 times a week
   4. ( ) 4 or more times a week

8. Do you go or have you gone in for a certain sport in a competitive sense?
   1. ( ) Yes
   2. ( ) No

9. How many pupils there are in your school?
   1. ( ) Under 100
   2. ( ) 101 - 200
   3. ( ) 201 - 300
   4. ( ) 301 - 400
   5. ( ) 401 - 500
   6. ( ) 0ver 500

10. How did you experienced the performance scoring by watching the videotape?

1. ( ) Easy
2. ( ) Moderate easy
3. ( ) Moderate
4. ( ) Moderate difficult
5. ( ) Difficult

11. Which locomotor skill did you experience as the easiest ? (please ring the appropriate letter)

A Run
B Gallop
C Hop
D Leap
E Horizontal jump
F Skip
G Slide

11.b Why?_____

12. Which one was the most difficult?

A Run
B Gallop
C Hop
D Leap
E Horizontal jump
F Skip
G Slide

12.b Why?_____

13. Which object control skill did you experience as the easiest?

H Two-hand strike
I Stationary bounce
J Catch
K Kick
L Overhand throw

13.b Why?_____

14. Which one was the most difficult?

H Two-hand strike
I Stationary bounce
J Catch
K Kick
L Overhand throw

14.b Why?_____

Please read carefully the following statements and ring the option that best illustrates your opinion.

1. I definetely agree
2. I slightly agree
3. I cannot say
4. I slightly disagree
5. I definetely agree

15. "The performance criteria were often open to various interpretations"

1 2 3 4 5

16. " It was was easier to observe the performance criteria from the videotape than in live situation"

1 2 3 4 5

17. " The number of criteria was too high to observe at the same time"

1 2 3 4 5

18. " The illustrations were helpful while watching the performances"

1 2 3 4 5

19. The introduction and training to use the test was

1. ( ) Slight
2. ( ) Adequate
3. ( ) Excessive

Please ring the appropriate option according your opinion. How often did you have difficulties with the following matters connected to the TGMD?

1. Never
2. Seldom
3. Sometimes
4. Often
5. Always

20. " To remember the performance criteria during the observing"

1 2 3 4 5

21. " To watch many criteria in performance at the same time"

1 2 3 4 5

22. " To decide whether to score pass or fail when there were irregular performances"

1 2 3 4 5

23. " To decide when the criterium is accomplished in performance"

1 2 3 4 5

24. " To notice the criterium because of the view angle"

1 2 3 4 5

25. Where do you think the TGMD would be the most appropriate in use?

1. ( ) In kindergardens
2. ( ) In primary schools
3. ( ) In secondary schools
4. ( ) In special schools

Thank you for your answers!

Here you can write your comments about the test or messages to the author.

_____

_____

_____

_____

_____

APPENDIX 3

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
VAR00015	20,5192	13,8232	,1402	,6822
VAR00017	20,5385	12,7632	,4430	,5804
VAR00018	20,3269	13,1655	,2729	,6322
VAR00020	21,0192	13,2349	,4169	,5898
VAR00021	20,6538	12,4268	,6519	,5374
VAR00022	20,6538	13,3288	,4358	,5868
VAR00023	21,0385	14,4299	,3387	,6133
VAR00024	22,3077	14,6486	,1793	,6487

Reliability Coefficients

N of Cases = 52,0 N of Items = 8

Alpha = ,6417

APPENDIX 4

Amount of false scores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25	1	1,9	1,9	1,9
	26	1	1,9	1,9	3,8
	32	1	1,9	1,9	5,8
	34	1	1,9	1,9	7,7
	35	2	3,8	3,8	11,5
	36	3	5,8	5,8	17,3
	37	1	1,9	1,9	19,2
	38	2	3,8	3,8	23,1
	39	4	7,7	7,7	30,8
	40	5	9,6	9,6	40,4
	41	1	1,9	1,9	42,3
	43	1	1,9	1,9	44,2
	44	6	11,5	11,5	55,8
	45	5	9,6	9,6	65,4
	46	8	15,4	15,4	80,8
	47	2	3,8	3,8	84,6
	48	2	3,8	3,8	88,5
	49	3	5,8	5,8	94,2
	58	3	5,8	5,8	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

False scores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<30	2	3,8	3,8	3,8
	31-35	4	7,7	7,7	11,5
	36-40	15	28,8	28,8	40,4
	41-45	13	25,0	25,0	65,4
	46-50	15	28,8	28,8	94,2
	56<	3	5,8	5,8	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

T-Test

Group Statistics

	Profession	N	Mean	Std. Deviation	Std. Error Mean
False scores	P.E. -teacher	26	3,38	1,36	,27
	Primary school teacher	26	4,42	1,10	,22

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confide Lower
False scores	Equal variances assumed	,879	,353	-3,027	50	,004	-1,04	,34	-1,73
	Equal variances not assumed			-3,027	47,952	,004	-1,04	,34	-1,73

Independent Samples Test

		t-test for 95% Confide Upper
False scores	Equal variances assumed	-,35
	Equal variances not assumed	-,35

APPENDIX 6

Oneway

Descriptives

			N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum
							Lower Bound	Upper Bound	
False scores	Experience	under 5	22	3,91	1,15	,25	3,40	4,42	2
		6-10	17	3,82	1,42	,35	3,09	4,56	1
		11-12	9	4,33	1,66	,55	3,06	5,61	1
		over 20 years	4	3,25	1,26	,63	1,25	5,25	2
		Total	52	3,90	1,33	,18	3,53	4,27	1

Descriptives

			Maximum
False scores	Experience	under 5	7
		6-10	7
		11-12	7
		over 20 years	5
		Total	7

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
False scores	Between Groups	3,480	3	1,160	,640	,593
	Within Groups	87,039	48	1,813		
	Total	90,519	51			

Oneway

Descriptives

			N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum
							Lower Bound	Upper Bound	
False scores	age	under 30	7	3,43	1,51	,57	2,03	4,83	1
		31-40	30	3,90	1,30	,24	3,42	4,38	1
		41-50	10	4,40	1,35	,43	3,43	5,37	2
		over 50 years	5	3,60	1,34	,60	1,93	5,27	2
		Total	52	3,90	1,33	,18	3,53	4,27	1

Descriptives

			Maximum
False scores	age	under 30	5
		31-40	7
		41-50	7
		over 50 years	5
		Total	7

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
False scores	Between Groups	4,505	3	1,502	,838	,480
	Within Groups	86,014	48	1,792		
	Total	90,519	51			

T-Test

Group Statistics

	sex	N	Mean	Std. Deviation	Std. Error Mean
False scores	female	22	3,91	1,23	,26
	male	30	3,90	1,42	,26

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confide Lower
False scores	Equal variances assumed	,009	,926	,024	50	,981	9,09E-03	,38	-,75
	Equal variances not assumed			,025	48,555	,980	9,09E-03	,37	-,73

Independent Samples Test

		t-test for 95% Confide Upper
False scores	Equal variances assumed	,77
	Equal variances not assumed	,75

Frequencies

Statistics

	N							
	Valid	Missing	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
The sum of scores	52	0	106,92	107,00	103[a]	12,17	83	130

a. Multiple modes exist. The smallest value is shown

The sum of scores

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	83	2	3,8	3,8	3,8
	89	2	3,8	3,8	7,7
	91	3	5,8	5,8	13,5
	92	2	3,8	3,8	17,3
	94	1	1,9	1,9	19,2
	95	1	1,9	1,9	21,2
	96	1	1,9	1,9	23,1
	97	1	1,9	1,9	25,0
	98	2	3,8	3,8	28,8
	99	2	3,8	3,8	32,7
	100	1	1,9	1,9	34,6
	103	4	7,7	7,7	42,3
	105	3	5,8	5,8	48,1
	106	1	1,9	1,9	50,0
	108	2	3,8	3,8	53,8
	110	1	1,9	1,9	55,8
	111	2	3,8	3,8	59,6
	112	1	1,9	1,9	61,5
	113	3	5,8	5,8	67,3
	115	3	5,8	5,8	73,1
	119	2	3,8	3,8	76,9
	120	4	7,7	7,7	84,6
	121	4	7,7	7,7	92,3
	124	1	1,9	1,9	94,2
	125	2	3,8	3,8	98,1
	130	1	1,9	1,9	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

T-Test

Group Statistics

	Profession	N	Mean	Std. Deviation	Std. Error Mean
Amount of criterion	P.E. -teacher	26	2,92	,98	,19
	Primary school teacher	26	2,42	,90	,18

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confide Lower
Amount of criterion	Equal variances assumed	2,799	,101	1,918	50	,061	,50	,26	-2,4E-02
	Equal variances not assumed			1,918	49,688	,061	,50	,26	-2,4E-02

Independent Samples Test

		t-test for 95% Confide Upper
Amount of criterion	Equal variances assumed	1,02
	Equal variances not assumed	1,02

T-Test

Group Statistics

	sex	N	Mean	Std. Deviation	Std. Error Mean
Remembering	male	30	2,57	,86	,16
	female	22	3,23	,81	,17

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Remembering	Equal variances assumed	,098	,755	-2,804	50	,007	-,66	,24
	Equal variances not assumed			-2,828	46,760	,007	-,66	,23

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Mean	
		Lower	Upper
Remembering	Equal variances assumed	-1,13	-,19
	Equal variances not assumed	-1,13	-,19

APPENDIX 12

T-Test

Group Statistics

	Profession	N	Mean	Std. Deviation	Std. Error Mean
Following	P.E. -teacher	26	2,96	,82	,16
	Primary school teacher	26	3,46	,71	,14

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confide Lower
Following	Equal variances assumed	,163	,688	-2,350	50	,023	-,50	,21	-,93
	Equal variances not assumed			-2,350	48,857	,023	-,50	,21	-,93

Independent Samples Test

		t-test for 95% Confide Upper
Following	Equal variances assumed	-7,3E-02
	Equal variances not assumed	-7,2E-02

Correlations

Correlations

		False scores	The experienced difficulty of the assesment...
Pearson Correlation	False scores	1,000	,298*
	The experienced difficulty of the assesment...	,298*	1,000
Sig. (2-tailed)	False scores	.	,032
	The experienced difficulty of the assesment...	,032	.
N	False scores	52	52
	The experienced difficulty of the assesment...	52	52

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

Frequencies

The easiest locomotor skill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Run	4	7,7	7,7	7,7
	Gallop	4	7,7	7,7	15,4
	Hop	3	5,8	5,8	21,2
	Leap	7	13,5	13,5	34,6
	Skip	6	11,5	11,5	46,2
	Slide	28	53,8	53,8	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

The most difficult locomotor skill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Run	7	13,5	13,5	13,5
	Gallop	1	1,9	1,9	15,4
	Leap	4	7,7	7,7	23,1
	H.Jump	30	57,7	57,7	80,8
	Skip	10	19,2	19,2	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

The easiest Control Skill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stationary Bounce	22	42,3	42,3	42,3
	Catch	26	50,0	50,0	92,3
	Overhand Throw	4	7,7	7,7	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

The most Difficult Object Controll Skill

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	two-Hand Strike	9	17,3	17,3	17,3
	Stationary Bounce	3	5,8	5,8	23,1
	Catch	3	5,8	5,8	28,8
	Kick	29	55,8	55,8	84,6
	Overhand Throw	8	15,4	15,4	100,0
	Total	52	100,0	100,0	
Total		52	100,0		

APPENDIX 15

sex * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
sex	female	Count	12	10	22
		% within sex	54,5%	45,5%	100,0%
		% within Profession	46,2%	38,5%	42,3%
	male	Count	14	16	30
		% within sex	46,7%	53,3%	100,0%
		% within Profession	53,8%	61,5%	57,7%
Total		Count	26	26	52
		% within sex	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%

age * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
age	under 30	Count	4	3	7
		% within age	57,1%	42,9%	100,0%
		% within Profession	15,4%	11,5%	13,5%
	31-40	Count	18	12	30
		% within age	60,0%	40,0%	100,0%
		% within Profession	69,2%	46,2%	57,7%
	41-50	Count	1	9	10
		% within age	10,0%	90,0%	100,0%
		% within Profession	3,8%	34,6%	19,2%
	over 50 years	Count	3	2	5
		% within age	60,0%	40,0%	100,0%
		% within Profession	11,5%	7,7%	9,6%
Total		Count	26	26	52
		% within age	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%

Present post * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
Present post	Permanent	Count	17	18	35
		% within Present post	48,6%	51,4%	100,0%
		% within Profession	65,4%	69,2%	67,3%
	Temporary	Count	3	2	5
		% within Present post	60,0%	40,0%	100,0%
		% within Profession	11,5%	7,7%	9,6%
	Substitute	Count	3	4	7
		% within Present post	42,9%	57,1%	100,0%
		% within Profession	11,5%	15,4%	13,5%
	Part-time	Count	3	2	5
		% within Present post	60,0%	40,0%	100,0%
		% within Profession	11,5%	7,7%	9,6%
Total		Count	26	26	52
		% within Present post	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%

Experience * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
Experience	under 5	Count	14	8	22
		% within Experience	63,6%	36,4%	100,0%
		% within Profession	53,8%	30,8%	42,3%
	6-10	Count	7	10	17
		% within Experience	41,2%	58,8%	100,0%
		% within Profession	26,9%	38,5%	32,7%
	11-12	Count	2	7	9
		% within Experience	22,2%	77,8%	100,0%
		% within Profession	7,7%	26,9%	17,3%
	over 20 years	Count	3	1	4
		% within Experience	75,0%	25,0%	100,0%
		% within Profession	11,5%	3,8%	7,7%
Total		Count	26	26	52
		% within Experience	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%

Size of the school * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
Size of the school	less than 100 pupils	Count		7	7
		% within Size of the school		100,0%	100,0%
		% within Profession		26,9%	13,5%
	101-200	Count	1	14	15
		% within Size of the school	6,7%	93,3%	100,0%
		% within Profession	3,8%	53,8%	28,8%
	201-300	Count		4	4
		% within Size of the school		100,0%	100,0%
		% within Profession		15,4%	7,7%
	301-400	Count	14	1	15
		% within Size of the school	93,3%	6,7%	100,0%
		% within Profession	53,8%	3,8%	28,8%
	401-500	Count	6		6
		% within Size of the school	100,0%		100,0%
		% within Profession	23,1%		11,5%
	more than 500 pupils	Count	5		5
		% within Size of the school	100,0%		100,0%
		% within Profession	19,2%		9,6%
Total		Count	26	26	52
		% within Size of the school	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%

Sport as a hobby * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
Sport as a hobby	Yes	Count	23	7	30
		% within Sport as a hobby	76,7%	23,3%	100,0%
		% within Profession	88,5%	26,9%	57,7%
	No	Count	3	19	22
		% within Sport as a hobby	13,6%	86,4%	100,0%
		% within Profession	11,5%	73,1%	42,3%
Total		Count	26	26	52
		% within Sport as a hobby	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%

Education * Profession Crosstabulation

			Profession		
			P.E. -teacher	Primary school teacher	Total
Education	Sports instructor	Count	2	2	4
		% within Education	50,0%	50,0%	100,0%
		% within Profession	7,7%	7,7%	7,7%
	M.Sc./human movement	Count	20		20
		% within Education	100,0%		100,0%
		% within Profession	76,9%		38,5%
	M.Sc./pedagogy	Count	1	22	23
		% within Education	4,3%	95,7%	100,0%
		% within Profession	3,8%	84,6%	44,2%
	M. of physical training	Count	3		3
		% within Education	100,0%		100,0%
		% within Profession	11,5%		5,8%
	Other	Count		2	2
		% within Education		100,0%	100,0%
		% within Profession		7,7%	3,8%
Total		Count	26	26	52
		% within Education	50,0%	50,0%	100,0%
		% within Profession	100,0%	100,0%	100,0%