Title

Using Physical Guidance To Teach Mentally Retarded Students

Abstract

The experiment, applying two commonly used coaching methods, was to teach two groups of mentally retarded students to hit a tennis ball using a forehand strike. The objective was to determine which method, physical guidance or demonstrations in conjunction with repeated movements, was a more effective instructional tool when used to teach moderately mentally retarded school children. In group one, using physical guidance, a teacher stood behind the students and guided their hands through the desired movement trajectory. In group two, a teacher demonstrated the forehand strike one time and the students repeated it fifteen times. Participants in both groups performed 300 trials during the Learning Phase. Based upon an earlier study, it was hypothesized that the performance of the physical guidance groups would be worse than that of the demonstration groups because physical guidance does not truly reinforce, or teach, the motor skills necessary to hit a forehand strike properly. During the Retention Test, which consisted of thirty unassisted trials, the demonstration group performed better than the physical guidance group. Currently physical guidance is one of the most popular methods employed by schools to teach Physical Education classes to moderately mentally retarded students, but it is not an effective way to teach motor skills.

Introduction

Adapted physical education is part of the total physical education experience because it shares the same teaching objective. Firstly, adapted physical education improves the neuromuscular system, thereby improving the overall physical fitness of students. Secondly, it develops in students desirable social skills such as good sportsmanship. Thirdly, it actively encourages students to participate in sports on a regular basis. Finally, it guides students as to how they should best spend their leisure time (Syllabus For Physical Education, 1995). The goals of each lesson are based on the student's needs and abilities.

Moderately mentally retarded students have unique physical education needs. Special schools provide an appropriate instructional setting for them because class size is small. Normally there are ten students in each class; thereby ensuring that every student receives proper care. The teachers are able to fulfill the individual needs of each student. The teacher has to determine what a student's actual age is. Although students in each class are almost the same chronological age, their mental ages vary widely. Therefore, teachers have to divide classes into several groups and teach them differently according to their abilities.

The sports program and the adapted physical education program are interrelated and interdependent. Teachers try to provide students with a balanced physical education curriculum in order to meet the students' unique needs. Before conducting a lesson,

teachers have to prepare a teaching plan that systematically details how and why their teaching method is effective. In Hong Kong, teachers in special schools always use task analysis to break down the step by step learning skills needed to teach students. Using basketball as an example, teachers determined what are the three main skills players used during a game. The skills are passing and receiving, dribbling and shooting. For the passing and receiving aspect of the game, teachers show students how to stop the ball as it rolls on the ground. They learn to receive the bouncing ball, which means they must move their bodies in order to catch it. After they have received the ball, they must learn how to pass the ball over their shoulder with one hand. Passing and receiving both utilize similar skills such as throwing the ball in the air with two hands and receiving it with two hands. The student also learns to throw the ball in the air with one hand, and to throw the ball forward. Dribbling and shooting skills are taught in a similar step by step method.

After using task analysis to do a breakdown of the skills required to learn how to play basketball, the question arises whether students are capable of effectively learning the motor skills from their teachers. Physical Education teachers, like the general population, sometimes believe that mentally retarded students aren't good at recreational, vocational or daily living motor tasks. This perception has arisen because most mentally retarded students show low motivation to learn new tasks (Gibson, 1980; Weisz, 1979). Mentally retarded students were unwilling to play when they were young children, and this affected their motor skill acquisition. Additionally, mentally retarded students' physical fitness is very low (Moon & Renzalaglia, 1982). Finally, most motor

performance contains cognitive components that may tax mentally retarded students to a greater extent than would be true of normal children.

Most PE teachers, after explaining the instructions, hold the student's hand while they practice motor skills. Teachers do this because they think that students may not understand the instructions, and will be unable to perform the motor skills. They assume that students can't practice the motor skills by themselves. If the teacher guides the student's hand to repetitively practice the motor skills, the student can automatically develop motor skills without having to pay attention to how, or what, they are learning.

It was hypothesized that the student's performance using physical guidance would be better than if demonstration and unguided practice were used during the Learning Phase. It was further hypothesized that the performance of both groups would improve with practice during the Learning Phase. Physical guidance learners were expected to perform worse during the Retention Test when guidance was removed; whereas, the performance of the demonstration group was expected to remain stable. This result would support the Guidance Hypothesis, which proposes that guidance prevents the acquisition of internally generated motor schemas (Wulf et al). In that experiment, participants were asked to use ski poles to guide them to learn a slalom ski-simulator. During the Learning Phase, with the help of ski poles, participants performed very well. However, when these poles were removed, participants' performances dropped off during the Retention Test. Guidance Hypothesis predicts that physical guidance is good for motor learning when used to reduce error. However, if relied upon, it will harm our learning process. The

following experiment created a similar situation. With the help of physical guidance, the participants' performed very well during the Learning Phase. But their performances dropped off dramatically, during the Retention Test, without the help of physical guidance.

Participants

Thirty moderately mentally retarded students from a Hong Kong special school participated in the experiment (mean age = 12.8, SD = 2.483). They suffered from autism, Downs Syndrome, and a variety of other congenital problems.

Apparatus

The equipment used was Dunlop Junior Rackets, 60 Dunlop Brilliance tennis balls, and a tennis ball container. Participants thought it would be easier to use junior rackets to hit the tennis balls.

Procedure

The experiment consisted of two phases: Learning Phase and Retention Test. Prior to the Learning Phase of the study, participants were randomly assigned to either physical guidance group (n = 15). The task for participants was to hit tennis balls onto a target area using a forehand stroke. In the physical guidance group, a teacher guided participants' hands to hit the balls. The other group first watched a teacher demonstrate a forehand strike, and then repeated the skill while trying to hit the balls. Participants hit

300 balls in 10 blocks during the Learning Phase, and afterwards both groups participated in 30 Retention Tests, in order to gauge how much they had learned. A score was given to the participants, depending on where the ball landed, relative to the target zone of 36 square meters.

Results

Learning Phase: As was expected, participants in both groups improved their skills. Although one group scored better than the other did, they both improved in the same way. Figure 1 illustrates the mean performance under two conditions, physical guidance and demonstration, over 10 blocks of 30 trials. Group x Block analysis of variance (10x30), with repeated measures on the Block factor, showed no main effect of Block ($F(9,20)$. Both a main effect of Group ($F(9,20) = 4.76$, $p = .002$ and interaction ($F(1,28) = 241.7$, $p = .00$) were evident.

Retention Test: A Group x Block (2x30) with repeated measures on Group factor was computed. Significant main effects of Block ($F(1,28) = 1798.6$, $p = .000$) and Group ($F(1,28) = 1854.224$, $p = .000$ were found. A significant interaction was evident ($F(1,28) = 11.16$, $p = .002$). The analysis shows us that the group who learned by demonstration performed better than the physical guidance group.

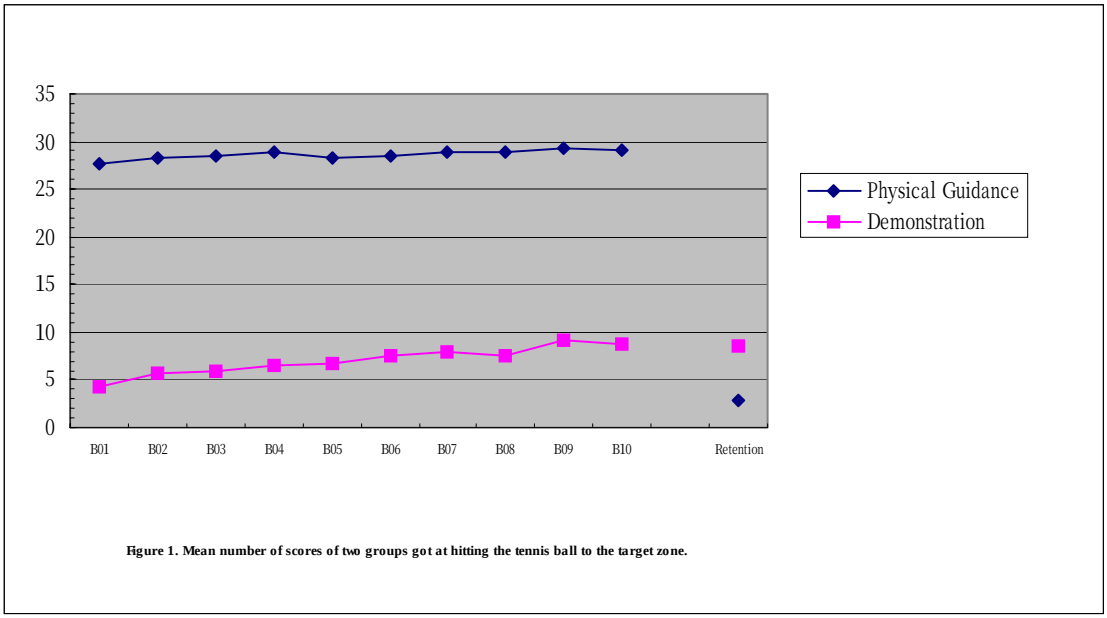

Figure 1. Mean number of scores of two groups got at hitting the tennis ball to the target zone.

Discussion

Effective instructional techniques and lots of practice can teach students different motor skill patterns. There are many different types of instructional techniques. The most common ones are verbal instruction, videotape replays of performance, physical guidance, and some techniques which increase a performer's sensory feedback. Students need guidance in order to learn different motor skills. Teachers often use verbal prompts to guide students to perform motor skills. For example, when a teacher teaches a student to perform a forehand strike in tennis, the teacher always stands by and asks the student to pull back their arm before they hit the ball with the racket. This is a verbal prompt. Sometimes, for safety's sake, teachers use guidance to teach students to perform motor skills. For example, teachers use training wheels to teach children to ride a bicycle. We must remember that no matter what kind of techniques we employ to teach students

different motor skills, the goal is always to get our students to perform motor skills without any help from others.

This experiment illustrates that using physical guidance isn't a good method for learning motor skills. In the Learning Phase, the teacher guided the student's hand movement. The student focused on the hand movement, instead of focusing on the trajectory of the tennis ball, as they used the racket to hit the ball. As a result, students couldn't hit the ball during the Retention Test they participated in afterwards. During the Retention Test, as the ball hit and bounced up from the ground, students had to decide when to pull back their rackets and hit the ball. Because students couldn't estimate the speed of the ball, they always failed to hit the ball. Meanwhile, the demonstration group had to continuously watch how the teacher hit the ball and to observe the trajectory of the bouncing ball during the Learning Phase. After practicing 300 times, they began to understand the motion of the bouncing ball. Their performance during the Retention Test was similar to their performance during the Learning Phase. Based upon the results of the experiment, we can generalize that to effectively teach moderately mentally retarded students different motor skills, teachers should not use physical guidance. Teachers must also bear in mind that certain guidance techniques work best at different stages of the learning process. A teaching method, which works during an early stage of learning, may not be effective during the final stage of learning. An effective teacher must be ready to change from one teaching method to another (Cratty 1973).

During the experiment, I found out that one or two students were unable to learn how to use a forehand strike to hit a tennis ball using the demonstration method of teaching. It may be that some students didn't understand the instructions the teacher gave, or they didn't concentrate as they practiced hitting the ball during the Learning Phase of the experience. This is very common among students enrolled in moderately mentally retarded Physical Education classes. The mentally retarded students don't always understand the dimensions of a task (Fish & Zeaman, 1973). After a while, mentally retarded students' experience a dramatic drop in their ability to concentrate. This lack of concentration slows their reaction time. Consequently, no matter what teaching method the teachers use, the students' performance always drops. There are definite reasons why physical guidance isn't an effective way to teach moderately mentally retarded students. Firstly, the actual skills learned are different from the skills learned through physical guidance. The muscles students use to perform skills with the help of physical guidance are used differently when they try to perform the skills without any help. Secondly, if teachers must always instruct students when and how to perform skills, the students are always dependent on others and cannot learn the timing and correct way to perform skills on their own. Thirdly, many studies show that mentally retarded students are very weak in predicting the arrival of a moving target. They also have problems with coincidence anticipation (Reid, 1986). If students learn motor skills through physical guidance, they never have an opportunity to cope with errors. During the Learning Phase, teachers guide students' hands and arms to hit the ball. Students don't have to be concerned with when and how to hit the ball. Trying to correct different kinds of errors is the key to success. It is critical that students experience failure in order to gain success. When students fail to

perform certain motor skills, they must make mental and physical adjustments and continue practicing the skill. This is the only way to perform the skill perfectly. If students aren't given opportunities to experience failure, they never have a chance to complete their learning. In daily life, students often need to perform different motor skills in the absence of teachers. Schmidt (1991) points out that "Guidance can diminish the learner's experience of performance errors. When this happens, individuals are also deprived of opportunities to correct their own errors, either during the production of slower movement or on the following attempt of more rapid ones." (p. 214)

Furthermore, physical guidance does not fully exploit the learners' processing of information skills. How we process and handle information is very important in performing skills. First, the learner must evaluate the information that he/she has gathered from circumstances outside of his/her control. Then he/she must decide what to do. At last, he/she performs the skill(s) based upon his/her judgement of the situation and what an appropriate response would be. Schmidt (1991) divides this "Three Information Processing Stages" into Stimulus Identification Stage, Response Selection Stage and Response Programming Stage. In the first stage, the learner tries to understand the environmental stimuli from all the information he/she is receiving. Before the forehand strike in tennis can be performed, first the student must look at the ball. He/she then tries to predict the track of the ball from its speed and distance. He/she must also use his/her hand to grip the racket, and prepare to hit the ball at the right time. The learner tries to do all he/she can to analyze the information from different sources such as vision, hearing, kinesthesia, etc. During stage two, the learner decides when and how he/she will perform

different skills according to the previous information he/she received. When the learner sees the ball land on the tennis court and rebound, he/she decides whether to respond or not. If the learner decides to respond to the stimulus, he/she must decide which response is appropriate. In the third stage, the learner must organize his/her motor skills system to perform the desired movement. During the Retention Test, the learners who had been given physical guidance were unable to process information well. They often failed to correctly identify the position and speed of the ball. They couldn't hit the ball.

Annett (1959) also tried to prove that physical guidance couldn't help students learn motor skills. He carried out an experiment to support what he proposed. In the experiment, he divided subjects into two groups. All the subjects were requested to press on a hand-operated lever using a certain amount of force. In the Learning Phase, one group had a visual aid. The group could see an apparatus that indicated the amount of force they used. With the help of the visual aid, Group One always stopped at the correct point when asked to press the hand-operated lever. Group Two didn't have any visual aid. They couldn't see the apparatus that showed the amount of force they applied. They were only told how well they pressed the hand-operated lever. During the Learning Phase, Group One performed excellently with the help of the visual aid. But when the visual aid was removed, they performed poorly compared to Group Two. During the test, one subject even pressed so hard that he broke the hand-operated lever. Therefore, in the Learning Phase, when teachers gave students physical guidance, the students learned faster and better. However, when students practiced motor skills on their own, their

performance was very regressive. This is because practicing motor skills with the aid of physical guidance is very different from using ones motor skills in an actual situation.

In conclusion, while physical guidance is initially the most convenient way to teach moderately mentally retarded students how to perform a new, or complex, movement skill, the above experiment shows that such techniques do little to improve movement skill learning over time. Furthermore, physical guidance techniques create an unwanted dependency in the students with respect to the teacher, who must provide the guidance. Rose (1997) expresses that “In order for learning to occur, individuals must engage in active movement so as to benefit from the rich sources of intrinsic sensory feedback available to them.” (p.254) Physical guidance not only decreases students’ motivation to learn motor skills; worse, it also spoils students’ intrinsic sensory perceptions and limits, or damages, their ability to learn.

Reference List

Cratty, B.J. (1973). *Teaching Motor Skill*. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Lane, N.E. (1987). *Skill Acquisition Rates and Patterns.* Springer – Verlag, New York.

Leonard d. Zaichkowsky & C. Zvi Fuchs (1986). *The Psychology of Motor Behavior: Development, Control, Learning and Performance.* Mouvement Publications, Inc., Ithaca, New York.

Rose, Debra J. (1997). *A Multi-level Approach to the Study of Motor Control and Learning*. Allyn and Bacon, Boston.

Schmidt, R.A., & Wrisberg, C.A. (2000*). Motor Learning and Performance: A Problem-Based Learning Approach* (2nd edition). Human Kinetics, Champaign, Illinois.

The Curriculum Development Council, (1995). *Syllabus For Physical Education.* The Government Printer. Hong Kong.

Winstein, C.J. & Pohl, P.S. & Lawthwaite, R. (1994*). Effects of Physical Guidance and Knowledge of Results on Motor Learning: Support for the Guidance*

Hypothesis. Research Quarterly for Exercise and Sport. Washington: Dec. 1997. Vol. 65, Iss. 4; p. 316

Wulf, G. & Shea, C.H. & Whitacre, C.A. (1998). *Physical-Guidance Benefits in Learning a Complex Motor Skill.* Journal of Motor Behavior. 30(4), Dec. 1998, p. 367 – 380.