Motor Skill Teaching Methodology and Implications for Taekwondo Instruction

Introduction

The method by which a motor skill is taught may drastically affect not only the initial learning time , but also the retention of the skill after it is learned. A common technique among instructors is to break up a skill into separate, and ideally logical, components for the student in order to simplify a potentially complex skill. Depending on the type of skill, this practice of separating a skill into parts may actually impede the learning process. This paper describes the whole, part, and whole-part methods of teaching a motor skill. In addition to exploring general guidelines for applying a particular teaching method, skills in the Korean martial art of Taekwondo are discussed and teaching methodology is suggested based on available research .

Teaching Methodology

Three typical instructional methods which have been employed in an effort to effectively teach motor skills are the whole, part, and whole-part methods. The part method may be further divided into the segmentation, fractionation, and simplification methods. The two main considerations that determine which method to use for a given skill are skill complexity and skill organization, both of which lay on a continuum. Skill complexity refers to the number of parts in the skill, as well as the information processing demands on the performer of the skill. Skill organization refers to the interrelation of the elements of the skill. In other words, it is a measure of the dependence of the skill's parts on each other (Magill, 1989; Singer, 1968).

The Whole Method

Using the whole method involves, as the name implies, teaching a skill as a whole. According to Naylor and Briggs (1963), if a skill is low in complexity and high in organization the whole method is recommended (as cited in Stammers, 1980). Typically, the reason for breaking a skill up is to simplify the skill because of its high complexity.

Low complexity skills generally do not require such simplification and the whole method is appropriate. In addition, when the

components of a skill are high in organization (i.e., largely dependent on each other), teaching the skill by breaking it up likely will not transfer well to the skill as a whole. This lack of transfer may occur because the coordination of the dependent parts tends to be a significant portion of learning such a skill. Interestingly, the whole method has been identified as more successful with subjects of higher intelligence (Singer, 1968).

The Part Method

The part method entails teaching separate components of a skill before teaching the skill as a whole. Naylor and Briggs (1963) suggest this method when the skill to be taught is high in complexity and low in organization (as cited in Stammers, 1980). A highly complex skill can be initially overwhelming to attempt as a whole, so breaking it up may be useful. When skill organization is low, the coordination of parts is not much of an issue and components may be practiced separately with little loss of transfer to the whole skill. If a skill is separated, the parts should be broken up into logical components. That is, each component should be able to be practiced as a separate and distinct sub-skill. The part method has also been identified by Schendel, Shields, and Katz (1978) as more effective than the whole method for low-aptitude or inexperienced students (as cited in Wightman & Lintern, 1985). Three different part methods have been identified for discussion: segmentation, fractionation, and simplification. Regardless of the specific method, practice of the whole skill should occur as quickly as possible after practicing the individual part or parts.

Segmentation

The segmentation of a skill involves separating a skill based on definable breaks in the skill. These breaks can be identified via temporal or spacial divisions (Wightman & Lintern, 1985). The backward-chaining technique has been reported as a particularly effective type of segmentation method in which the last part of a skill is practiced first; then, earlier parts are sequentially added from last to first until the whole skill is complete. However, because the segments need not be practiced sequentially, an

advantage of the segmentation method is the ability to practice particularly difficult components of a skill without practicing the more easily learned parts of the

skill--which may avoid boredom.

Fractionation.

When two parts of a skill are performed simultaneously, the fractionation method may be appropriate for teaching the skill. The fractionation method involves performing each part of a skill separately before attempting them simultaneously. However, if two or more parts of a skill are to be performed concurrently, it appears likely that the skill is high in organization, at least between those parts. Recall that the part method is recommended for skills low in organization. Hence, an apparent contradiction. No clear cut guidelines exist and instructors are encouraged to experiment with various methods as they see fit.

Simplification.

The method of simplification is one in which a difficult skill is made less difficult by changing one or more features of the skill (Wightman & Lintern, 1985). This method is often employed when the whole skill is so high in complexity that learners have difficulty performing the skill in its entirety. Although the simplification method typically provides positive transfer to the whole skill, that transfer often is inferior to practicing the whole skill with no simplification. However, if students are unable to perform a given skill, simplification may be necessary to get them started and build their confidence. Care, though, must be taken to simplify the skill in such a way that will not decrease transfer of the simplified skill to the desired whole skill. In other words, keep the simplified skill as similar to the 'real' skill as possible.

The Whole-Part Method

Whole-part practice incorporates both whole and part methods into one method. One way to practice this method is to attempt the whole skill first, then break the skill down into parts that are of particular difficulty for the student, then practice the whole skill again. This process is repeated as many times as necessary for the student to learn

the whole skill adequately. Perhaps whole-part-whole(-part-whole...) is more appropriate nomenclature for this approach. If the student has attempted the whole skill, practicing separate components may make more sense to him

or her and the incorporation of the partial skill into the whole skill may occur in a more smooth manner. The student may better understand the end which then may help justify the means.

Implications For Taekwondo

Taekwondo involves a variety of motor skills which require appropriate teaching methods for optimal instructional effectiveness. Hand techniques involve simultaneous asymmetrical arm movement that can be quite challenging for many beginners. Kicking techniques call for multi-joint flexion and/or extension, oftentimes simultaneously. *Poomse*, or forms, involve performing the same techniques in the same order, much like a floor routine in gymnastics. And *kyorugi*, or free sparring, is a highly dynamic skill which incorporates many separate skills such as footwork, kicking, and blocking in a free-flowing contest.

Hand Techniques.

Many hand techniques in Taekwondo consist of one arm performing a strike or block while the other arm simultaneously moves in a counter motion different from the striking or blocking motion. This asymmetrical arm movement can be quite difficult and is the cause of frustration for many beginning students--much like rubbing one's stomach while attempting to pat one's head, or other similar activities. Observational analysis can prove quite humorous, with hands landing everywhere but the desired location and an end result resembling a bad disco pose...but I digress. Klapp and his associates (1987) found that a whole method emphasizing an integrated and unified conception of the skill was much more effective than the part method for teaching a skill that involved both hands moving simultaneously (as cited in Summers & Kennedy, 1992). These findings suggest that both arm movements of a strike or block should be practiced together in a whole method approach. Additionally, the whole method should be reinforced with an understanding of the actions of both arms and their purpose. As noted earlier, beginning students can become quite frustrated when first attempting blocking motions. In order to

give these students some sense of accomplishment, breaking the skill up via the fractionation part method may be appropriate. After each arm motion is practiced separately, they should be practiced together as soon as possible.

Kicking Techniques.

Taekwondo kicking techniques tend to be highly organized. In other words, the initial components of a kick affect later components of the kick to a large degree. Many of the kicks are also high in complexity, potentially involving both flexion and extension of multiple joints at the same time. No recommendations for high organization, high complexity tasks were found. However, Naylor and Briggs (1963) did find that the whole method was more effective than a part method with high difficulty (complexity), high interaction (organization) tasks (as cited in Wightman & Lintern, 1985). These results mildly imply the use of the whole method would be beneficial for teaching kicking techniques. However, even highly coordinated students may have initial difficulty with new kicking techniques. Although Taekwondo kicks are high in organization, most kicks have distinct parts that can be separated, and often are, by instructors. The whole-part method is recommended when students are having difficulty with the whole skill--the type of part method utilized will depend on the kick and the perceived difficulty of the student by the instructor.

Poomse.

Poomse consists of stances, blocks, strikes, and kicks performed in a prearranged order in response to imaginary attackers coming from different directions (International Council on Martial Arts Education, 1986). Poomse, like a floor routine in gymnastics, incorporates previously learned skills in a series. Mane (1984) found transfer from the part method to be superior to the whole method in teaching a serial skill (as

cited in Schmidt, 1988). This type of result may be expected when the difficult parts of the skill are the ones separated for part practice. Hence, when a particular portion of the poomse is giving the student trouble, utilizing the segmentation part method may prove beneficial. In the absence of trouble spots, the poomse should be practiced as a whole to coordinate the transition from one move to the next. Like dance and gymnastics, the aesthetics of the poomse are part of the judging criteria, along with power, balance, and focus. In addition, a repetitive-part method may prove beneficial in teaching poomse. In a repetitive-part approach, one portion of the poomse would be practiced first (i.e., the first four or five steps). Then, subsequent portions of the poomse are added until the whole poomse is performed.

Kyorugi.

Unlike the predetermined steps of poomse, kyorugi is an open skill (i.e., lots of variety) performed with at least one partner or opponent. Due to the highly kinetic nature of full-contact kyorugi, the whole method would not be a prudent approach to teaching this skill to beginners. Assuming that requisite sparring skills have been learned, lead-up activities may prove beneficial to the student. This type of simplification part method can provide the student with a less threatening version of kyorugi. Some examples of such simplification are footwork sparring (no kicking, so no contact), limiting the number of techniques each student may attempt in a row, designating one person as the attacker and one as the defender, and a host of drills in which a specified technique occurs in response to another specific technique (i.e., counter and timing drills with a partner). These drills may achieve more realism by allowing the attacker to initiate the motion, forcing the defender to react as if in a true kyorugi

situation. Breaking the skill down in such a way allows the student to focus their attention on one part of the skill and concern about the outcome, and their safety, may be reduced (Dunham, Dunham, & Dunham, 1988).

Summary

The structure of practice is the most critical learning variable in motor learning. One portion of that structure crucial to the learning process is the methodology utilized in teaching a skill. The number of different skills for even one sport can reach a staggering number. Fortunately for instructors and coaches, physical skills may be categorized and teaching methods attempted based on previous research regarding those categories. The part method may be utilized when a skill is complex, but the components of the skill are not dependent on one another. In general, the whole method is recommended for skills in which the components of the skill are not complex yet are highly dependent upon each other. The whole-part method may prove useful when a skill does not fit nicely into one of the two previously mentioned categories. The whole-part (or whole-part-whole...) method also allows for a large amount of flexibility for an instructor. For example, if students are experiencing difficulty with a given skill, it may be broken down via any one of a variety of part methods, followed soon after with practice of the whole skill as soon as the students appear ready. Also, in instances when the student may be in danger were s/he to attempt a certain skill, simplification of the skill including lead-up activities may prove helpful. Care should be taken to make lead-up activities, as well as any part task, as similar to the ‘real’ task as possible to increase the chances of maximal transfer.

Taekwondo includes a wide variety of different skills which require distinct teaching strategies. The martial arts have historically been handed

down from teacher to student with little or no explanation of the teaching methodology. It was the obligation of the student to figure out the reason why something was taught the way it was. This style of instruction forced the student to think and to come to his or her own conclusions. It also allowed for potentially erroneous conclusions, which hopefully the instructor would catch. Unfortunately, errors by students have gone unnoticed by instructors over the centuries and many instructional practices within the martial arts are based on misunderstood methods. This paper attempted to match some of the skills in Taekwondo with appropriate teaching methods based on research findings. However, the research cited is not only not specific to Taekwondo, but also much of it is not specific to sport skills, and the theoretical match-ups are just that--theoretical. Hence, research specific to Taekwondo is needed in order to test these and other postulated methods for their effectiveness, efficiency, and transfer. In the absence of scientific research, instructors can always learn and experiment with new teaching methodology--thereby insuring continual growth.

REFERENCES

Dunham, P., Dunham, T, & Dunham, T. A. (1988). Effect of practice procedure on skill acquisition. Perceptual and Motor Skills, 66, 512-514.

International Council on Martial Arts Education (1986). Taekwondo forms: complete and official forms of the World Taekwondo Federation. Seoul, Korea: Nanam.

Magill, R. A. (1989). Motor learning: concepts and applications (3rd ed.). Dubuque, IA: Wm. C. Brown.

Schmidt, R. A. (1988). Motor control and learning (2nd ed.). Champaign, IL: Human Kinetics.

Singer, R. N. (1968). Motor learning and human performance; an application to physical education skills. New York, NY: Macmillan.

Stammers, R. B. (1980). Part and whole practice for a tracking task: effects of task variables and amount of practice. Perceptual and Motor Skills, 50, 203-210.

Summers, J. J., & Kennedy, T. M. (1992). Strategies in the production of a 5:3 polyrhythm. Human Movement Science, 11, 101-112.

Wightman, D. C., & Lintern, G. (1985). Part-task training for tracking and manual control. Human Factors, 27 (3), 267-283.