EFFECTS OF VISUAL, VERBAL, VISUAL + VERBAL FEEDBACK ON LEARNING OF DRIBBLING AND LAY UP SKILL.

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

YASIN AKINCI

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF PHYSICAL EDUCATION AND SPORTS

DECEMBER 2004

Approval of Graduate School of Social Sciences

_____

Prof. Dr. Sencer AYATA

Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

_____

Prof. Dr. Feza KORKUSUZ

Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science in Physical Education and Sports.

_____

Assist. Prof. Dr. Sadettin KİRAZCI

Supervisor

Examining Committee Members

Prof. Dr. Ömer GEBAN	(METU, EDU)	_____
Assoc. Prof. Dr. Settar KOCAK	(METU, PES)	_____
Assist. Prof. Dr. Sadettin KİRAZCI	(METU, PES)	_____

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name: Yasin Akıncı

Signature:

ABSTRACT

EFFECTS OF VISUAL, VERBAL, VISUAL + VERBAL FEEDBACK ON LEARNING OF DRIBBLING AND LAY UP SKILL.

Akıncı, Yasin
M. S., Department of Physical Education and Sports
Supervisor: Assist. Prof. Dr. Sadettin Kirazcı

December 2004, 79 Pages

The purpose of this study was to examine how different feedback conditions effect the skill learning in basketball. Two task were selected and participants were randomly grouped and assigned to the verbal, visual + verbal, and visual feedback groups. In task one, a continuos skill of basketball, dribbling and in task two a discrete skill of basketball lay up skill were used. Two experts evaluated performances of the participants. In the study first a pre test applied to the subjects to form the groups than a day later subjects performed both task 15 times (5 trails in 3 sets) and get relevant feedback after every 5 trails for three consequent days. 72 hours later a retention test was applied to the subjects to test learning.

A 3 × 2 (Group × Condition) ANOVA was used to calculate the differences between the groups in the pre test and post test conditions. The results indicated no

significant difference between the groups for the two skills in the pre test but the post-test results indicated significant difference among the verbal to visual + verbal group, visual to visual + verbal group and verbal and visual group. The total difference scores of the groups were also significant where visual + verbal condition indicated the highest improvement whereas the visual condition indicated the least improvement in the two selected basketball skills.

The study indicated that the verbal feedback for novice group caused better improvement and retention of the dribbling and lay-up basketball skills compared to the visual feedback group.

Key Words: Skill Learning, Basketball, Videotape Feedback, Verbal Feedback

ÖZ

İŞİTSEL, GÖRSEL + İŞİTSEL VE GÖRSEL GERİ BİLDİRİMİN, TOP SÜRME VE TURNİKE BECERİLERİNİN ÖĞRENİMİNE ETKİSİ.

Akıncı, Yasin
Yüksek Lisans, Beden Eğitimi ve Spor Bölümü
Tez Yöneticisi: Yrd. Doç. Sadettin Kirazcı

Aralık 2004, 79 sayfa

Bu çalışmanın amacı farklı geribildirim yöntemlerinin basketbolda beceri öğrenilmesini nasıl etkilediğini araştırmaktır. Bu doğrultuda basketbola özgü iki beceri belirlenmiş ve katılımcılar rasgele guruplanarak geri bildirim guruplarına atanmışlardır. Öncelikle deneklerin basketbolda top sürme (dribbling) ve turnike becerileri birinci günde yapılan ön testle belirlenmiştir. Çalışmanın üçüncü, dördüncü ve beşinci günlerde top sürme ve turnike becerisini 15 defa tekrarlamışlar ve her 5 denemeden sonra geri bildirim almışlardır. Çalışmanın sekizinci gününde deneklere 5 tekrarlı son hatırlatma testi uygulanmıştır. Deneklerin görsel, görsel + sözel, sözel gruplardaki ön test ve son test farkları ANOVA ile hesaplanmıştır.Sonuç olarak hatırlama testinde görsel + sözel geri bildirim grubunundaki kalıcılık, sadece görsel ve sadece sözel geri bildirm gruplarından ve diğer taraftan, sözel geri bildirim grubu göresl geri bildirim gruplarından anlamlı olarak daha yüksek olmuştur.

Grupların ön test ve son test toplam farklllarına bakıldığında görsel + sözel grubu en yüksek gelişmeyi ve sadece görsel geri bildirim ise en az gelişmeyi sağladığı bulunmuştur.

Bu veriler ışığı altında çalışmaya katılan başlangıç seviyesindeki top sürme ve turnike sözel geri bildirim ile daha kalıcı olduğunu göstermiştir.

Anahtar Kelimeler: Beceri Öğrenimi, Basketbol, Videolu Geri Bildirim, Canlı Geri Bildirim

ACKNOWLEDGEMENTS

I would like to express sincere thanks to a number of people who helped me throughout the research. First of all, I am thankful to my supervisor Assist. Prof. Dr. Sadettin Kirazcı for his guidance, advice, criticism and encouragements. My appreciation is also extended to the members of thesis committee, Assoc. Prof. Dr. Settar Koçak, and Prof. Dr. Ömer Geban for their suggestions and comments.

I would also like to thank my friends, Barış Sözeri, Güler Arsal, Mehmet Aydemir and Serkan Sarıkaya, for their assistance during data collection, writing and publishing of this study.

And finally, I would like to thank to my parents who under all circumstances, always encouraged and supported me.

TABLE OF CONTENTS

LIST OF TABLES

TABLES

LIST OF FIGURES

FIGURES

LIST OF ABBREVIATIONS

F.B : Feedback

VTFB : Video Tape Feedback

KP : Knowledge of Performance

KR : Knowledge of Results

M: Mean

MS : Mean Square

SS : Sum of Squares

CHAPTER I

INTRODUCTION

In the last years, researchers have interested in the factors that affect learning. These factors are relevant with the teacher, task difficulty, learner and environment. The environmental factors are very important for skill acquiring, mostly referred to as motor learning which is defined as "a relatively permanent change in motor behaviour. Modifications in motor behaviour results of maturation, motivation or training factors (such as improvements in speed)" (Sage, 1977, p 1-9). Providing information about the movement is the most important part of the skill learning activities.

Providing information to the learners about the performed action is called feedback and it is very necessary for acquiring new skill. In many studies understanding the role of feedback captured the direct attention of the researchers (Newell, Morris, & Scully, 1985; Salmoni, Schmidt & Water, 1984; Schmidt,1985, Thorndike, 1927). It is important to understand the role of feedback, for both the learners and the teachers. The role of learning mainly depends on the feedback, which is properly provided by teachers. While performing the action or after the action, individuals can get some information about their action from different sensory channels intrinsically. When the performer detects errors during execution or in the following movement trails. Intrinsic sensory feedback is appropriate in some

situations to detect errors but some situations is not. In such situations, extra feedback from an external source may be essential for learning to occur, if the task requirements is not clear, or the learner is not familiar to the goals and movement relationship.

Comments of a teacher coach, or instructor (in the form of knowledge of performance KP) the digital display of stopwatch, the hand marked score of judge (in the form of KR). The film of match and a video replay of certain action, and so on is generally defined as Augmented feedback (Schmidt & Wrisherg, 2000)

Feedback has many functions which are motivational, reinforcement information and dependency producing functions (Schmidt & Wrisberg, 2000). Augmented feedback primarily energises the learner and increase their motivations especially for the boring and repetitive tasks, sudden increase in performance is seen by the addition of augmented feedback in this situation feedback function like a stimulator that makes the learner perform the movement again and better. Another function of augmented feedback is reinforcement. When learners get positive augmented feedback from the instructor, it functions as reinforcer.

Learners gain a lot of information about the their actions by receiving feedback. Learners can understand that what kind of direction they need to correct their errors and have a choice to increase their future performance. Teachers and instructors are the essential part of learning process by the role of informational properties of feedback, the kind of feedback, the amount of feedback, and the frequency of feedback presentation are among the essential questions to answer for instructors and teachers. For this reason in the last years the concern of the studies changed to search

the variations of feedback, timing, format and scheduling of augmented feedback to understand under which conditions motor skill learning is optimised.

Early studies assumed that the submission of more frequent immediate or certain feedback during practise increased the learning of skills (Bilodeau & Bilodeau 1958 ; Bilodeau, Blodeau & Schumsky, 1959; Thorndike, 1927(as Cited is Schmidt & Wrisberg, 2000). The issue of how feedback functioned for skill acquisition was generally based on Thorndike's law of effect (Schmidt & Wrisberg, 2000)). In this law, learning involved the strengthening of the bond between a stimulus and a response and extrinsic feedback increased the strength of that bond. Therefore, the assumption of Thorndike, theorised that feedback should be given as often as possible. He suggested that if feedback was not presented after on action, individuals could not determine the outcome from their own intrinsic feedback no strengthening of the bond would occur. The view about the nature of learning and the effect of feedback has changed by the recent studies (Solmoni et al., 1984; Swinnen, 1996). The findings of this studies revealed that the less frequent and less immediate feedback is more affective for performance but more useful for the final learning of motor skill that can be observed with the retention tests.(Schmidt, Young, Swinnen & Shapiro, 1989; Swinnen, Schmidt, Nieholson & Shapiro 1990; Winstein & Schmidt, 1990)

In the study of Gaadognoli, Dornier, and Tondy,(1996) optimal frequency of feedback is both task and the performer relevant. That is a relatively difficult task or novice performer, a high feedback frequency seems to be more affective to learning than a low frequency. However with a relatively easy task or experienced performer

a high feedback frequency seems to be less beneficial to learning than a low frequency. Guaonoli at al (1996).

In conclusion which way the feedback was used depend on the nature of task and learner.These studies are closely related with the feedback dependency. Frequently given feedback is like to guide the learner's action to the goal movement. To explain the dependency producing function of feedback researchers presented the guidance hypothesis that feedback is a mean to guide performers' actions with a both positive and negative "side effects" (Salmoni at al, 1984; Schmidt et al, 1989; Schmidt & Wrisberg, 2000)

Learners can correct errors and develop consequent trails performance by using knowledge about the results of a movement. The using of frequent augmented feedback is also because of over reliance on the guiding properties of the feedback. Therefore, it prevents with critical between trial information processing involving coding storage and retrieval operations that is important in terms of learning dimension. (Bjork, 1988; Landauer & Bjork, 1987; Schmidt & Lee, 1999; Schmidt & Wrisberg 2000)

Some forms of feedback scheduling methods; summary, average, bandwidth, relative frequency and faded feedback with these methods, teachers' coaches or instructors can reduce the learner's dependency to the information provided by feedback.

Even though, many studies consider the importance of different types and schedules of feedback to the learning process, in last decade technological advances have taken a role in the feedback with the development of video tape and computer analysis.

> The use of videotape feedback (VTFB) has strong intuitive appeal with the sport domain. It is assumed that seeing ones' movement with VTFB

> prompts corrections and subsequently enhances performance. The results have been interpreted from a cognitive perspective, based on the notion that learners compare on screen images to a criterion, detect errors, and make correction on subsequent trails. Despite somewhat inconsistent findings, the results suggest VTFB can enhance skill acquisition, yet its' effect appears to be relevant by learner characteristics, with increased benefits realised by those more skilful at the task or having more experience with or exposure to VTFB. According to these conclusions learners gain knowledge about the task or experience viewing VTFB, they become more adept at selecting information, noting errors, and putting the information in use (Gibson & Darden, 1999, p. 9).

Using video as a form of performance feedback can be an effective tool to improve motor skill learning and performance. This framework should provide guidance for instructors employing videotape and should ultimately lead to more consistent and effective use of video technology in learning environments. Video may also be essential in increasing the amount and quality of feedback a learner receives during motor skill practice. In this application, videotape is used as a form of performance feedback provided to the student to enhance the learning process.

Research regarding VTFB has been relatively limited, and some studies have concluded that VTFB is not always beneficial (e.g., Boyce, Markos, Jenkins, & Loftus, 1996). Ineffective use of VTFB for learning has been attributed to such variables as level of performer, type of skill or movement, instructor-provided feedback, and frequency of viewing. These and other variables should be considered when using VTFB to increase motor skill learning

1.1. The Problems of the Study

The following study investigated the differences in the learning of two fundamental skills of basketball sport, with verbal, visual + verbal, and visual feedback. The goal was to examine the effect of verbal feedback condition, visual + verbal feedback

condition and visual feedback condition processing from the pre to post test condition. In the experiments dribbling and lay-up tasks were used.

1.2. The Hypotheses

The purpose of this study was to test the following hyphothesis:

1. There were significant difference in the scores of the verbal, vissual + verbal, and verbal feedback conditions in the post test results indicating learning effect.

2.There were significant difference in the total difference scores of the verbal, visual + verbal, and verbal feedback indicating an improvement from pre to post test.

1.3. Operational Definitions

Motor Learning: A set of internal processes associated with practice or experience leading to relatively permanent changes in the capability for motor skill (Schmidt & Lee, 1999).

Dribbling: After controlling the ball, bouncing the ball at the position of standing or moving without other players touch (See Appendix D figure :9).

Lay Up: After dribbling the ball or receiving the pass making two steps toward the basket then shooting the ball to the basket (See Appendix D figure :8).

Feedback: Sensory information that results from movement (Schmidt & Lee, 1999).

Augmented Feedback: A generic term used to describe information about performing a skill that is added to sensory feedback and comes from a source external to the person performing the skill. It is sometimes referred to as extrinsic or external feedback (Magill, 2001b).

Knowledge of Results (KR): Augmented feedback related to the nature of the result produced in terms of the environmental goal (Schmidt & Lee, 1999).

Absolute Frequency of Knowledge of Results: The absolute number of KRs given in a sequence of trials (Schmidt & Lee, 1999).

Relative Frequency of Knowledge of Results: The percentage of trials for which KR is provided; the absolute frequency divided by the number of trials (Schmidt & Lee, 1999).

Verbal feedback: Type of feedback that experts use to convey information to the performer verbally.

Visual + verbal feedback: type of feedback that performer received information in combination with the use of a video and verbally.

Retention Test: A test of a practiced skill that learner performs following an interval of time after practice has ceased (Magill, 2001b).

1.4. Assumptions of study

It is assumed that subjects in all groups followed the instructions provided by the experimenter at the beginning of the test.

It is assumed that the subjects did not practice any basketball skill during the test period. An another limitation of the study was the age of the participants namely 9-10 years of age.

1.5 Significance of the Study

Instruction in the form of feedback during and after practice sessions is an important factor that affects the rate and the amount of learning.Verbal feedback in learning process is the most widely used way of giving feedback. It only requires

observing the performer. Giving verbal feedback makes the students dependent to instructor and feedback but once feedback is removed performance and learning automatically decreases.

The use of videotape to provide visual performance feedback to learners is now a days common practice in sports and physical education. The concrete assumptions for the effect of videotape feedback (VTFB) are motivational factors and providing information regarding current and aimed performance characteristics. On the other hand, VTFB can highlight the most difficult aspects of specific movement patterns since VTFB also highlights associated cognitive processes (e.g.,self-talk, anxiety) that influence both performance and learning.

If verbal feedback combined with VTFB learner gains more knowledge about the task or experience, he or she becomes more adept at selecting information, finding the errors and correcting them in next trails.

CHAPTER II

REVIEW OF LITERATURE

Feedback refers to performance-related information that the individual obtains during and after performing the skill, when it is used in reference to performing a motor skill. It has been well established that feedback plays an important role in acquiring motor skills (Magill, 2001a). Certainly, one of the most critical variables affecting motor skill learning, aside from practice itself, is feedback (Schmidt, 1988).

According to classical motor learning theory, some form of feedback is required for motor learning to occur. Motor patterns and improvements in movement efficiency can be learned using intrinsic feedback, provided to the performer by the sensory systems (visual, auditory, proprioceptive, vestibular, and cutaneous) as a result of movement.

If learners are throwing a dart at a target, they can see where it lands and feel the temporary sensation in their arm and shoulder. If learners are playing a musical instrument, they can hear the pleasant and not so pleasant sounding notes they produce and feel the sensation in their mouths and fingers. Through these sensory channels, people can gain information about many aspects of their movements even before completed.

2.1. Augmented feedback

Augmented feedback known as extrinsic feedback, is supplemental information given to the performer about the task. It originates from an external source, such as biofeedback, videotape, and verbal or tactile cues. When intrinsic sensory feedback is not available, critical task requirements are not clear, or the learner is not familiar with the relationship between the goal and required movements, therefore, augmented feedback is necessary for learning to occur. Conversely, motor learning can be inhibited by augmented feedback if the movement provides enough intrinsic feedback to influence behaviour. Augmented feedback is an important component of the communication between instructor and learner in skill learning. It is especially important in performance situations where intrinsic sensory feedback is not available, where critical task requirements are not clear, or the learner is not familiar with the relationship between the goal and required movements.

2.1.1. Roles of augmented feedback in skill acquisition

Augmented feedback plays two important roles in the skill learning process. Firstly, it provides the learner with information about the patterns of action. Informational feedback provides people the nature and direction of their errors. Also, it suggests ways of correcting these errors. Furthermore, acquiring such feedback throughout the learning process is what gives instructors and therapists a crucial role.

The second role is to motivate the learner to continue striving toward a performance achievement goal. Individual motivation is further improved, when they are progressing to the goals they set for themselves. Providing augmented feedback

to the learner serves the functions of energising individuals and increasing their motivation.

Early studies indicated that when augmented feedback was not given, subjects tended to become bored (Arps, 1920 (as cited in Salmoni et al., 1984); Crawley, 1926 (as cited in Salmoni et al., 1984)). When augmented feedback was given, it caused subjects to try harder, to practice longer after augmented feedback was withdrawn, and generally to be more interested in the task. In previous study, the addition of feedback produced an immediate increase in performance proficiency, as if the feedback were a kind of stimulant that got individuals going. Elwell and Grindleys' experiment (1938, as cited in Magill, 2001a) being one of the earliest research in which participants practiced a two hand coordination task with augmented feedback provided. The experimenters interpreted the performance decline as evidence that the participants had lost interest in the task, which they also based on the increase in participants' complaints and late arrivals for experimental sessions after the augmented feedback was removed. Such studies suggest a direct motivational role for augmented feedback in performance.

Other motivational role of augmented feedback is that it rewards correct actions and punishes incorrect actions (Adams, 1968). Considering the Thorndike's law of effect (1927, as cited in Schmidt and Wrisberg, 2000), augmented feedback strengthened the bond between same stimulus and a response, so that repeated practice of the movement with augmented feedback allowed the learner to produce the proper response.

Although the motivational and informational role of augmented feedback is important for skill acquisition, there is no need for augmented feedback in every

situation. The need for augmented feedback to learn a skill relies on particular characteristics of a skill or learning environment. If task-intrinsic feedback provides the essential information to determine the performance error, there is no need for additional augmented feedback. Even, additional feedback may lead to more negative rather than positive learning outcomes. For certain skills and skill performance situations, the critical task-intrinsic information needed to determine the appropriateness of a movement is not available or cannot be used by learner. In such situations, augmented feedback can be essential for skill acquisition.

2.1.2. Types of augmented feedback

The research literature about augmented feedback and motor skill acquisition refers to two types of augmented feedback: knowledge of performance (KP) and knowledge of results (KR). Feedback can provide two basic types of information. Information concerning the outcome of performance referred to as knowledge of results (KR), provides the learner with information on the outcome of the action. This is most often provided when the perceptual-sensory system cannot gather the information.. The second type, knowledge of performance (KP), provides information on the movement characteristics

2.1.2.1. Knowledge of performance

Knowledge of results (KR) is information about how the outcome of a task compares with success in achieving the task goal. The learning benefits of KR are well known and have been the focus of most research in the area of feedback and motor learning (Salmon), Schmidt, & Walter, 1984; Schmidt, 1988). In many learning situations,

however, an instructor gives information about the movement pattern produced by the performer; this information is known as knowledge of performance, or KP (Gentile, 1972; Salmoni et al., 1984; Schmidt, 1988). In earlier work, the typical procedure used by researchers to examine KP was to ask subjects to reproduce a specific goal movement pattern. KP about the movement produced was provided in the form of kinematic (Newell, Carlton, & Antoniou, 1990), kinetic (Newell & Carlton, 1987; Newell, Sparrow, & Quinn, 1985; Warren & Lehman, 1975), or videotaped (Carroll & Bandura, 1982, 1985, 1987, 1990) feedback. KP was often displayed as a function of the goal or template pattern; that is, KP was superimposed over the template pattern. Using this approach, investigators have shown that KP has potential learning benefits. Furthermore, template information was found to benefit learning, especially when the goal pattern was unfamiliar to subjects (Newell & Carlton, 1987; Newell et al., 1990). The results of those studies are not surprising, because the template that was available provided detailed information about the task goal. Furthermore, the feedback provided about the movement pattern produced served as both KP and KR because it informed subjects about the movement pattern used as well as the task outcome. In fact, in more recent work using this approach, the kinematic feedback presented in this manner has been referred to as KR (Winstein & Schmidt, 1990; Wulf, 1992; Wulf Schmidt, & Deubel, 1993). The point to be made here is that for learning this type of task, the KP provided may serve as a form of KR, for which the learning benefits are already well known (Salmon) et al., 1984; Schmidt, 1988). More important, the results of these studies can be generalised only to learning situations in which the goal is to reproduce a specific movement pattern. Real-world examples of this type of task would be gymnastics or

springboard diving, in which the goal is to produce a very specific, aesthetically pleasing pattern of movement. In many learning situations, however, the goal of the task is not isomorphic with a specific movement pattern. In other words, reproducing a specific movement pattern is not the goal of the task. Rather, different movement patterns can be used that achieve the same outcome. KR provides information relative to the success in achieving the task goal. However, KR does not directly inform the subject about the movement pattern used or what adjustments should be made to the movement so that the task goal can be achieved. A good example of this type of task would be a golf shot. For this task, many different patterns of swinging the club can be used so that the ball is hit to the same place. KR informs subjects about where the ball landed, and KP informs the subjects about the movement pattern used. Several authors have examined the benefits of KP for learning a task whose goal is not isomorphic with a specific movement pattern. In all of these studies, however, an optimal movement pattern was either identified (Del Rey, 1971; English, 1942; Hatze, 1976; Howell, 1956; Kernodle & Carlton, 1992; Nickerson, Kalikow, & Stevens, 1976; Schmidt & Young, 1991; Young & Schmidt, 1992) or implied (Newell, Quinn, Sparrow, & Walter, 1983; Wallace & Hagler, 1979) as the criterion to be achieved. In these studies, the optimal movement pattern characteristics were made available in different ways: in the form of a videotaped expert model (Del Rey, 1971; Kernodle & Carlton, 1992), by the identification of desirable kinematic or kinetic characteristics of the movement pattern (English, 1942; Hatze, 1976; Howell, 1956; Newell et al., 1983; Nickerson et al., 1976; Schmidt & Young, 1991; Young & Schmidt, 1992), or from an instructor who gave corrections about the movement pattern with a desired movement pattern in mind

(Wallace & Hagler, 1979). These studies have demonstrated that KP can be useful for learning this type of task when a criterion template pattern is identified as a reference with which subjects can compare KP

2.1.2.2. Knowledge of results

KR has been defined as augmented feedback related to the nature of the result produced in terms of environmental goal (schmidt & lee, 1999). This form of feedback is useful in situations where the performer must wait for the judges' scores -- as in gymnastics, diving, etc. -- or in sports such as archery and rifle, where it is not always possible to immediately view the results. KR is frequently used in the laboratory setting to enable controls in the information given to subjects. Early experiments conducted to evaluate the importance of KR indicate that when a learner cannot detect his/her own performance errors through intrinsic feedback, very little learning occurs unless KR is evident.

KR is widely considered as a crucial variable in the acquisition of skills. It is generally viewed as the most important variable for determining learning (Bilodeau, 1966). Disregarding KR as a variable in the study of learning would decrease our understanding of skill acquisition considerably.

For many years, researchers try to answer the question of how often, or under which kind of schedule, should KR be provided to maximize learning and performance. In the early studies of feedback, it was generally assumed that the provision of more frequent, immediate or precise knowledge of result (KR) during practice facilitated the learning of skills (Bilodeau & Bilodeau, 1958; Bilodeau et al., 1959; Schmidt, 1975). The general problem of these early studies is that most

experimenters have nearly uniformly failed to distinguish the temporary effects of KR manipulations from their relatively permanent effects, which are regarded as being due to learning. Because the vital feature of learning is that it causes a relatively permanent change in behaviour.

The most common and widely accepted definition of learning is that it is a relatively permanent change, resulting from practice or experience, in the capability for responding. Central to this focus is the strength of this capability as a function of variables associated with practice. These various capabilities can be considered as states that underlie a skilled behaviour. Therefore, changes in behaviour with practice may reflect changes in an underlying capability for responding that is learning. Also, the acquired capability should be relatively permanent that is the effect of acquired capability should persist well beyond the practice session. These notions are important to the design of experiments on learning.

Actually, the notion of differentiating the relatively permanent effect from the transitory effects of practice is not new. Most researchers, who examined learning, had designed their experiments according to these effects.

In most KR experiments, the important consideration is the relative importance of trials with KR versus trials without KR in facilitating learning. In answering such questions, two primary variables have come out from such research (Salmoni et. al., 1984; Schmidt, 1988). These are absolute frequency and relative frequency.

2.1.3. Relative and Absolute frequency of KR

While augmented feedback has long been regarded as a variable instrumental to efficient motor skill learning (Thorndike, 1927), the past decade has seen renewed interest in the effects of variations in format, timing, and scheduling of augmented feedback to determine the conditions under which motor skill learning is optimised. Augmented feedback has traditionally been classified into two broad categories: knowledge of results (KR) which focuses on the outcome of movement in terms of the environmental goal, and knowledge of performance (KP) which is concerned with kinematic aspects of the movement pattern (Schmidt, 1982). In most practical skill acquisition environments, KR is obtainable by the learner without the need to depend on an outside agent for its delivery. However, KP is usually not obtainable without an outside agent; thus, it is commonly provided by an instructor to augment KR.

Salmoni, Schmidt, and Walter (1984) point out that research on KR has been prolific, while the research on KP has been minimal. The preference for KR in experimental work is very likely due to the comparable ease with which it can be acquired, controlled, and quantified in a laboratory setting. In addition, the single degree of freedom tasks commonly employed in the laboratory typically presents KR as error information. With these relatively simple tasks, error feedback is often isomorphic, with information about the change necessary to the movement pattern to achieve the goal. Thus, the "distinctiveness" of KR from KP is not clear cut.

Although KR and KP are, by definition, distinct sources of information, some research demonstrates that KP functions comparably to KR with respect to motor learning (Young & Schmidt, 1992; Young, 1992). However, more

experimentation is required to determine whether empirical results from KR studies can be generalised to KP as a source of information to promote learning. One KR topic sparsely applied to KP is the relative frequency of feedback scheduling during learning trials. Two types of scheduling variables are absolute frequency and relative frequency of feedback (KR or KP). The absolute number of times feedback is given in an instructional progression is referred to as absolute frequency, while relative frequency is the total number of times feedback is given relative to the total number of trials attempted.

Several KR studies over the past decade have revealed that variations in KR scheduling which reduce the relative frequency of feedback during acquisition prove to be more beneficial for long-term skill retention than practice conditions with feedback provided more often. Ho and Shea, (1978), Winstein and Schmidt, (1990), and Sparrow and Summers (1992) have demonstrated that when long-term retention tests are given, groups receiving less than 100% KR outperform groups receiving KR on a 100% relative frequency basis. Winstein, (1988) hypothesised that furnishing KR more frequently is temporarily more beneficial to practice performance than providing it less frequently. These beneficial effects however, may not be advantageous to learning, as assessed by no-KR retention tests, due to an increased chance that the learner develops a dependency on KR to support performance. In contrast, infrequent KR does not possess the strong guidance properties of 100% KR, and therefore forces the participant to undertake various alternative information-processing activities during acquisition to maintain effective performance. The end result is more effective performance in the absence of KR, such as in a retention test,

than for participants who have not had a chance to explore these skills in acquisition due to KR being constantly present.

The interpretation for this somewhat surprising outcome is that 100% KR is viewed as being too guiding, causing the learner to become too reliant on this external reference to support performance. This excessive reliance on KR may obstruct the processing of significant task-related details and, therefore, impede the formation of error detection and correction capabilities (Schmidt & White, 1972) necessary at the time of retention and transfer. This idea is termed the guidance hypothesis by Salmoni, et al. (1984).

It is more common in a non-laboratory learning environment to provide the learner with KP. However, it is not well established whether the beneficial learning effects of reduced relative frequency of KR will generalize to the use of KP. In one of the few studies to examine scheduling frequency of KP, Young and Schmidt (1992) manipulated the scheduling of augmented kinematic feedback as a form of KP. The task was a single degree of freedom back swing then forward swing of a fixed lever to a specific spatiotemporal point coincident with illumination of lights on a Bassin anticipation timer. Young and Schmidt (1992) contrasted feedback schedules after every trial (100% relative frequency) or as averaged information after every set of five trials (20% relative frequency). Their results did not support the prediction of the guidance hypothesis for acquisition in that the mean acquisition performance of groups was statistically equal. However, their retention results paralleled earlier KR work in that a reduced frequency of KP was more beneficial for retention performance than 100% relative frequency.

2.1.4. Guiding properties of augmented feedback

The guidance hypothesis has been proposed to explain the aforementioned KR findings (Salmoni et al., 1984; Schmidt, 1991; Schmidt et al., 1989). In essence, augmented feedback is thought to have guiding properties that have both beneficial and detrimental effects on motor learning. The beneficial effects are thought to be the well-known informational properties of augmented feedback in which knowledge about outcome is used to correct errors and improve subsequent performance. The effectiveness of augmented feedback in error identification and reduction, however, is thought to be detrimental in that it prevents or interferes with critical between-trial information processing involving encoding, storage, and retrieval operations, such as problem solving, known to be important for learning (Bjork, 1988; Landauer & Bjork, 1978; Schmidt, 1991). Thus, the guidance hypothesis proposes that a practice schedule with relatively infrequent augmented feedback trials would be optimal in that it would maximise the beneficial effects and minimise the detrimental effects of augmented feedback on motor skill learning. Further, if the guiding properties of augmented feedback interfere with processes important for learning, feedback that is relatively more guiding would be expected to have greater detrimental effects on motor learning.

Winstein and Schmidt (1990) had tested the predictions of the guidance hypothesis by reducing the frequency of KR during acquisition. And they had revealed beneficial learning effects resulting from the lower frequency of KR. In their experiment, participants had to move a lever in an attempt to produce a goal movement pattern in 800 ms under either 100% or 50% relative frequency of KR conditions in a faded schedule. The results of the no-KR retention test indicated that

the 50% KR group produced significantly smaller root mean square errors (Rmse) than the 100% KR group. Consistent with the predictions of the guidance hypothesis, Winstein and Schmidt (1990) suggested that lower relative frequencies might enhance learning because no-KR trials may cause the participants to engage in additional important cognitive processes such as those related to error detection

2.2. Verbal feedback

An alternative source of data on the effects of verbal feedback is sport pedagogy research (Keh, & Magill, 1993). While establishing the relationship between teacher feedback and student achievement has proved difficult, two noteworthy trends are apparent. Firstly, when movement patterns serve as the dependent variable, verbal feedback enhances learning; and secondly when the dependent measure is an outcome score the length of practice influences the effect of teacher feedback. With relatively short practice phases, teacher feedback and student outcome scores appear unrelated. However, outcomes and feedback are positively related when practice time is extended. These results suggest that verbal feedback enhance the acquisition of appropriate movement patterns, which subsequently leads to improved outcomes. This conclusion is tentative and further research is needed.
Observing a learning model and getting augmented verbal feedback appears to be beneficial in the acquisition and retention of tennis volley skills. Female students randomly assigned to four groups were pre-tested and performed 50 acquisition trials and a retention test. Results showed that the group, which both monitored a learning model's trials and feedback and received verbal feedback from an instructor, had the best movement pattern and retention outcome. The group that only received

augmented verbal instructor feedback and the group that only monitored a learning model's trials and feedback displayed less skilful movement patterns and lower retention than the group that received both interventions, but they fared better than the control group

2.3. Modelling

Another common mode of providing technique-related information is modelling. Most modelling research has been guided by Bandura's (1977, 1986) social cognitive theory, which views observational learning primarily as an information-processing activity. Modelling helps learners develop a cognitive representation, which is used to regulate movement production and serves as a standard of correctness for error detection (Carroll & Bandura, 1990). The research has consistently shown that modelling facilitates skill acquisition, and the benefits are particularly evident in the development of movement patterns early in learning (Magill, 1993b; Mccullagh, 1993).

Modelling generally refers to the demonstration of correct technique by an instructor. However, in applied settings, learners also observe peers who are practicing a skill. The potential learning benefits of peer observation have been recognised by theorists in both cognitive and motor domains. in classroom settings, learning has been enhanced by exposure to coping models, who initially perform poorly, but improve with practice (Schunk, 1987). Theoretical explanations for these benefits centre on enhancement of self-efficacy and coping/problem-solving strategies. in the motor domain, an initially unskilled model who is observed practicing a skill is called a learning model. Adams, (1986) noted that, when learning

models are observed, two sources of information are typically available: the model's movements and any feedback that the model receives. He hypothesised that attending to a learning model's trials and feedback could facilitate learning by aiding in the development of cognitive representations and involving the observer in problem-solving activities regarding error correction.

2.4. Visual Feedback

The use of visual, videotape feedback (VTFB), has strong intuitive appeal with the sport domain. It is assumed that seeing ones' movement with VTFB prompts corrections and subsequently enhances performance. The results have been interpreted from a cognitive perspective, based on the notion that learners compare on screen images to a criterion, detect errors, and make correction on subsequent trails. Despite somewhat inconsistent findings, the results suggest VTFB can enhance skill acquisition, yet its' effect appears to be relevant by learner characteristics, with increased benefits realised by those more skilful at the task or having more experience with or exposure to VTFB. According to these conclusions learners gain knowledge about the task or experience viewing VTFB, they become more adept at selecting information, noting errors, and putting the information in use.

2.4.1. Videotape Feedback and Learner

It is believed that VTFB functions like other forms of feedback to serves primarily to increase learning, to motivate learners, and to reinforce behaviours (Christina & Corcos, 1988). Instructors must adhere to sound principles and guidelines for providing performance feedback. Perhaps the most important point of

research in instructional feedback is that the amount and type of feedback depends largely on the level of learning and the characteristics of the skill (Magill, 1994). For example, less precise feedback should be provided to beginning learners. Likewise, the use of VTFB should depend on the learning process. A traditional way of understanding the learning process is through the stages of learning. These stages, describing the characteristics of learners, can be applied to the unique nature of VTFB to increase its effectiveness. Like any form of feedback, it must be used wisely to maximise learning.

It is known that the discomfort and anxiety students' felt when trying to learn a new motor skill. Similarly, students may have experienced the initial "shock," anxiety, and somewhat negative feelings associated with seeing ourselves on video. For effective skill feedback to occur, students must overcome their natural discomfort of viewing themselves on video.

During this stage, most students cannot attend to critical task-related elements and effectively learn from VTFB. Hebert and Landin (1997) found that for a group of novice learners, VTFB did not positively affect skill learning until after the first two days of viewing. Similar examples of age-related differences were found by Boyce et al., (1996). From a comparison of different forms of feedback - including teacher-provided verbal feedback, VTFB, and feedback from peers - Boyce et al. discovered that teacher-provided verbal feedback was often the most effective for third graders learning sport skills. However, for fifth graders, more improvement occurred when they received VTFB rather than teacher-provided verbal feedback or peer feedback. Boyce et al,(1996). and Hebert and Landin (1997) both suggest that beginners and

younger students might be more dependent on teacher feedback and less able to process and use VTFB.

The findings of Janelle et al, (1994) are consistent with the well-established notion that motor skill learning is enhanced when the amount of feedback is decreased as the learner improves, so as to avoid a sense of dependency on the feedback (Magill, 1994, 1998).

Learners in this stage often become more "internal" in producing and correcting movements. In other words, they are likely to attend to, interpret, and use internal information (i.e., "kinesthetic" feel) from their bodies (Boyce, 1991). Additionally, advanced learners are more able to switch their attention from an external perspective (seeing themselves through the camera's lens) to an internal one (seeing and feeling themselves perform through their own eyes).

2.4.2 Nature of Thinking and VTFB.

Hebert (1996) assessed the impact of VTFB on the performance of highly skilled and experienced tennis players and examined the nature of their thinking during the video tape observation. Participants in the study were 6 female members of NCAA tennis division 1 tennis team. Twice a week for weeks during pre season practice , they were filmed performing 30 trails of an attacking ground stroke. The impact of VTFB on performance was assessed using a multiple baseline design. Following the collection of baseline data, 4 players received the intervention, watching video tape replays of practice session on the day of following each session, while 2 players did not receive the intervention and served as controls. During videotape observation, participants were encouraged to comment freely and were

questioned about their thoughts, what they noticed, how they used the information. Three performances related dependent measures were assessed throughout the study: outcome scores, players court positioning, and point of ball racket contact. Visual inspection of graphically displayed performance data indicated notable changes from baseline to intervention in all three dependent measures for 3 of the 4 intervention participants. Players comments during video tape observation session focused on a number of technical components (e.g., racket preparation & swing trajectory), with each player selecting one or few components as a error correction. Qualitative analysis of audio taped observation sessions resulted in the development of a 4- stage progression through which players moved: (a) Becoming accustomed to viewing on the screen image, (b) detecting errors, (c) connecting movement pattern characteristics to trail outcomes, and (d) forming and implementing an error correction strategy. Their results add to limited research on the efficacy of adding VTFB to the training of high level athletes, support the cognitive interpretation of VTFB findings, and provide a basis for understanding the mediating effect of experience. Following, results are suggest that VTFB can enhance skill acquisition, yet its impact mediated by the learner characteristics, with increased benefits realised by those more skilful at the tasks or having more experienced with or exposure to VTFB. These conclusions suggest that as learners gain knowledge about the tasks or experience viewing VTFB, they become more adept at selecting information, noting errors, and putting the information to use.

2.4.3 Videotape Feedback and Expert Novice Paradigm

In the process of learning motor skill can be provided by different sources and different frequencies. For providing visual feedback photograph, camera, video and mirror are the most common used objects. In general videotape feedback beneficial for the both advanced and novice students (Penman, Arnold & Davis, 1968).

Not all studies have found support for the specificity of learning hypothesis, however. Bennett and Davids (1995) used the power lift squat as the movement task and an expert-novice paradigm while providing three levels of visual feedback*:* subjects performed in front of a mirror, with ambient vision but no mirror, or blindfolded. The experts were not affected by the visual manipulations, whereas the novices performed better when they were provided vision (mirror condition). Bennett and David's raised the relevant question of the importance versus the necessity of vision for the performance of the task and its bearing on other research into specificity of learning. Because the manipulation of the necessary sensory information may be required so that one can elicit the specificity of motor learning effect.

The effect of videotape feedback on the learning of tennis service by novice volleyball players was examined by Van- Wierimngen, Emmen, Bootsma, Hoogestyer & Whiting, (1985). The first group received modelling learning with videotape, the second group received videotape feedback and the third group attained as control group. All of the groups attended the 5 courses with 45 minutes. The results of the study revealed that there were no significant differences among the three groups on the learning of the tennis service.

Robertson and her colleagues have manipulated vision during the traversing of a balance beam. In the first of two studies, Robertson, Collins, Elliott, and Starkes (1994) compared expert and novice gymnasts' ability to walk rapidly along a balance beam in varied visual conditions. In the second study only three visual conditions were used: full vision, no vision, and no vision plus an 8-s delay. Taken together, the authors suggested, the results of these studies supported neither the motor program view (e.g. McCabe & Schmidt, 1976) nor a strict specificity of motor learning view. Because of the expert gymnasts were not affected by the visual manipulations. In a subsequent study, Robertson and Elliott (1996) abandoned the expert-novice paradigm to gain more experimental control over the sensory conditions experienced during practice, training novice gymnasts to walk across the balance beam in either full vision or no vision. In this case, Robertson and Elliott (1996) concluded that their results were consistent with a modest specificity of learning hypothesis because the test performances of the gymnasts improved to a greater extent when test conditions were the same as practice conditions.

2.4.4. Videotaped Feedback: Immediate or Delayed

The theoretical assumptions underlying the effects of VTFB centre on motivational factors and providing information regarding current and preferred performance characteristics Landin and Menickelli (1996). VTFB has recently been the focus of renewed interest by investigators and the findings tend to support the assumed theoretical bases. The typical research paradigm involving VTFB has been a delay condition in which the athletes receive post work out VTFB and then attempt to apply the information in a subsequent practice session. Improvements in

technology now make sophisticated movement analyses readily available in the field and it may be beneficial to provide VTFB immediately. Therefore, it was the purpose of this study to compare the effects of VTFB provided under immediate (after every 15 trials) and delayed conditions. Six members of a NCAA Division l tennis team practiced high-arcing topspin forehand (FH) and backhand (BH) ground-strokes within a multiple baseline design. During baseline conditions the athletes hit 30 FHs and 30 BHs, in a counterbalanced order, followed by a 30 hit drill in which the strokes were performed in an alternating fashion. After establishing baselines, two athletes began receiving the intervention. One athlete was randomly selected to receive the VTFB at three predetermined points in the drills, while the other received VTFB in the lab the following day. All VTFB sessions included cues and the total time of VTFB observation was held constant under each condition. The intervention protocol was applied to the remaining players as required in a multiple baseline design. Data were collected on two dependent measures, outcomes (scored on a 0-1-2 basis, maximum trial score = 2) and movement patterns (two elements score don a 0-1-2 basis, maximum trial score = 4).The results indicate that all athletes made notable improvements from baseline to intervention on both dependent measures. However, there were no substantial differences in the magnitude of the improvement produced by the two conditions. Our conclusion is that, for these athletes, immediate and delayed VTFB were equally effective in promoting performance improvements

2.4.5. Videotape Feedback with Verbal Cues

The use of videotape to provide performance feedback to athletes is a common practice in sport. The theoretical assumptions underlying the effect of

VTFB revolve around motivational factors and providing information regarding current and aimed performance characteristics.

Menickelli & Grisham (1996), hypothesis that VTFB that included specific augmented cues would result in greater, and more immediate, performance increase than the un cued VTFB. Ten members of a NCAA division 1 gymnastics team volunteered to act as participants for this study. The coaches as a general team weakness identified the skill, vaulting. The athletes were split in to two groups of five. The VTFB intervention for the first group was uncued. The second group received augmented cues based on the coaches' templates of the ideal element for vaulting was previously decelerated, while viewing the tapes. Visual inspection of plotted data showed that both cued and un cued VTFB reduced performance variability. Further, VTFB + cues produced a greater magnitude of change than VTFB without cues. These results supported the hypothesis that cued VTFB prompts greater and more immediate changes than un- cued VTFB, and suggests that even highly skilled athletes initially need guidance when the time receiving VTFB.

2.5. Comparison of Different Feedback Conditions

In many studies it was found that videotape feedback has positive effect on motor skill learning (Rikli, 1980).

Burkhard, Patterson & Rapue, (1967), examined the effect of visual and verbal feedback to the learning of karate skills for 13 student at the average age of 15 years old. Students grouped with 6 and 7 subjects and they attended the karate courses during 9 weeks. One of the group received verbal the other group received visual

feedback. The results were demonstrated that subjects in visual group who had the chance of watching their performance exhibited greater improvement than the verbal group.

In the study Selder & Del Rolan (1979), compared the 12-13 years old females' ability to walk alone on balance beam. The first group received verbal feedback after every trail and the other group received videotape feedback. During the first five week of the study there were no significant difference between the groups where as at the end of 6^{th} week, the group received videotape feedback demonstrated great improvement than the verbal feedback-receiving group.

The effect of visual feedback on weight lifting skill was investigated in the Sewall, Reeve & Days' study (1988). The results revealed that subjects who made practice in front of a mirror was showed greater technical development than the visual feedback-receiving group.

Synchronise swimmers four different vertical swimming positions was recorded and investigated Starkes et al., (1989). The subjects at the age of 17-22 were grouped in 3 according to their ability level and evaluated. First group received visual +verbal feedback the second group received only visual feedback and the third group only received verbal feedback. The subjects who were at the advance level performed the skills more correctly graphic than the intermediate level; subjects at the intermediate level performed the skills more correctly graphic than the beginning level.

Whiting (1989), examined the effect of visual feedback on the development of the tennis service skill. 22 subjects were separated in to three groups the first group was visual feedback teaching group, the second group was traditional teaching

group and third group was control group. 5 week teaching process was applied to three groups. Every course was 40 minutes; 30 minutes of the course was practice and 10 minutes of the course was watching the performance from videotape and analysis of tennis service technique. Results indicated that videotape feedback and traditional teaching group were demonstrated much more improvement then the control group. On the other hand there was no statistically significant difference between the videotape feedback group and traditional teaching group.

Lozano, (1991), examined the effect of different feedback condition on jumping skill in volleyball. 33 male and 11 female at the age of 12 were participated the study. The results of the study revealed that videotape feedback group had the highest scores than the other 3 groups.

In the study, Mclauglin (1999), separated 47-university student in to three groups as subjects of the study. The effect of visual feedback and visual perception on the learning of the softball skill was examined in the study. The results of the study showed that the scores of the groups who received visual feedback or provided visual perception were higher than both the traditional and control group.

CHAPTER III

METHOD

3.1. Subjects:

Twenty four male and twenty one female third grade students of Arı collage primary school were selected as subjects of the study. The average age of the students was 9.2 yr. with a standard deviation of .2 years. They had no previous experience in basketball or similar tasks. Table 1 presented detailed information about participants' numbers and ages.

Table 1

Descriptive information about the numbers, and ages of participants in the study of dribbling and lay up tasks.

	Number of participants		Age (years)		
Condition	Female	Male	Mean	SD	Range
Visual	8	7	9.3	0.1	9-10
Verbal	7	8	9.5	0.3	9-10
Visual + Verbal	9	6	9.4	0.2	9-10

Note: Visual = Visual feedback receiving group, Verbal = verbal feedback receiving group, Visual +Verbal = Visual and verbal feedback receiving group.

3.2. Apparatus and Task

The experts used a basketball dribbling and lay up skill evaluation check list that had "A", class basketball-coaching certificate.

The reliability and the validity of the checklist were done by Çamur (2001) (See Appendix A). The study was done in basketball gymnasium in Arı collage. The baskets were at the official height (3.05 m) and participants performed both task with No:5 size basketball ball. A Sony 700X camera that was connected to a 55-cm screen TV was used to recorded subject's performance. Subjects in the video and video + verbal feedback group watched their own performance on the colour TV.

Both the experts and cameraman had the full vision of participants' performance during the whole experiment. The lay out of the gymnasium was shown in Figure 1.

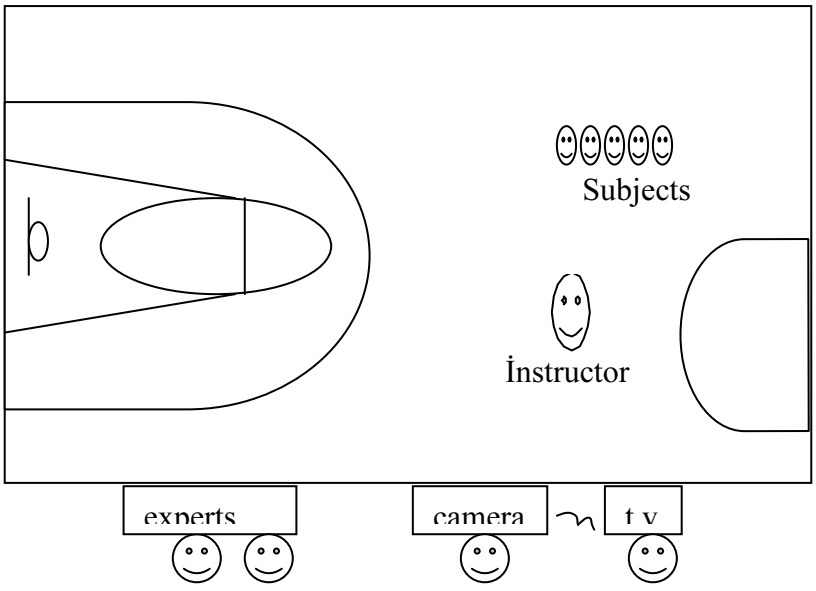


Figure 1: Gymnasium lay out during the experiments.

For this study the tasks were dribbling and lay-up skill in basketball. The goal of the dribbling skill was to dribble the ball around the cones with using correct technique. The distance between the cones was ten metres. The participants performed this task with their dominant hand.

The goal of the lay-up task was to perform the correct lay-up technique (see Appendix B) at the right or left side of the court according to dominant hand. Participants, who were right handed, performed the task on the right side of the court, participants who, were left handed performed the task on the left side of the court. The distance between the players and the basket was 7 meters. The dribbling task and the lay up task shown in Figure 2.

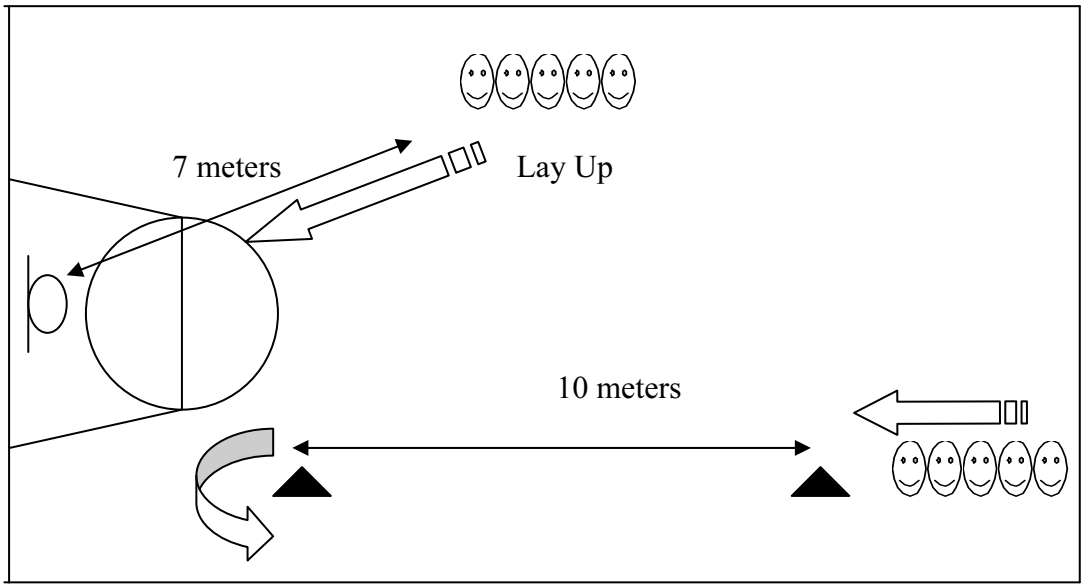


Figure 2: The Dribbling and Lay Up Task In The Court

Before the subjects had started to perform task the instructor demonstrated correct technique and explained the important parts of the skills (see Appendix C). Experts evaluated the participants while they were performing the skills and subjects received feedbacks according to expert's evaluation, (See Appendix D). Instructor

gave to the performer verbally the most important four-feedback title from the skill evaluation chart.

3.3. Procedure and Design

In this study three groups receiving verbal only, visual only and verbal + visual knowledge of performance practiced the lay-up and dribbling skill of basketball. The study was conducted on eight days for one feedback group. The schematic design of the study was given in Table 2. On day one participants performed two tasks with five trials as pre test and experts evaluated them with three scores for tasks and sub tittles of tasks. Subjects were assigned to the feedback groups according to their course schedules. On day two, participants were in 24-hour rest interval meanwhile both the teachers and parents were aware of study and were informed to keep the students away from playing and watching basketball. On day 3, 4, and 5 the subjects performed the training (acquisition).

In acquisition phase firstly subjects were separated in to three groups with five participants for every feedback group. The first five subjects performed the task five times then received feedback. While the first five subjects were receiving the feedback the second five started to task. When the first five finished to receiving feedback waited a little for second five students to finish the task and went to receive feedback. This process applied during the three training day (See Appendix C).

After 72 –hour, a retention test was applied on the eight day. Subjects completed a total of 15 trials for retention post test. During the retention test no subjects received any feedback

Table 2

The process of study day by day

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Pre test	Waiting	Training			Waiting		Post test

3.4. Statistical Design

A schematic representation of the statistical design is given in Table 3. A significance level of $p<.05$ was set for all statistical tests.

Table 3

Statistical design for dribbling and lay up skill

GROUPS	N	PRE TEST	POST TEST	RETENTION
Visual Feedback.	S 1 - S15			
Verbal Feedback	S 1 - S15			
Visual +verbal Feedback	S 1 - S15			

Note. Scores for pre test post test and retention blocks represents avarage mean of subjects total scores.

To test the hypothesis and to calculate the group differences in pre test and post test, data were analysed by 3 × 2 (Group × Condition) analysis of variance (ANOVA).

Tukey's honestly significant difference (HSD) procedure was adopted for all follow up comparisons, when appropriate.

3.5. Reliability of the Experts

Prior to the data collection of this study, the reliability of the two experts was examined, evaluating the performance of the 15 subjects independently.According to that evaluation the mean, standard deviation and the case values of the analyses have shown in the table 4.

Table 4

The reliability of the experts

	Cases	Mean	SD
Expert 1	30	43.70	19.34
Expert 2	30	44.07	20.44

Note: Cases: Dribbling and Lay Up Case for 15 Subjects, Mean = Mean score; SD = Standard Deviation

Covariance matrix and correlation matrix was used for the reliability of the experts. And the scores of these analyses methods were given in table 4.

Table 5

Covariance matrix and correlation matrix scores

	Covariance Matrix		Correlation Matrix	
	Expert 1	Expert 2	Expert 1	Expert 2
Expert 1	373.94		1.00	
Expert 2	391.81	417.86	.99	1.00

Estimated reliability of scale .99 and Unbiased estimate of reliability, 99. Both the R values are greater than .70 so these results indicates that the experts were highly reliable between and within.

CHAPTER IV

RESULTS

It was hyphotised that there were significant differences in the post test scores of visual, verbal, and visual + verbal feedback conditions and there were significant difference in the total difference scores of the visual, verbal, and visual + verbal feedback indicating an improvement from pre to post test.

Mean scores and standart deviations of dribbling and lay up skill for three feedback conditon during pre test and post test were represented in the table 6.

Table 6

Mean scores and standart deviation during pre test and post test of skills (N=45).

		Dribbling		Lay Up	
Groups		Pre Test	Post Test	Pre Test	Post Test
Verbal	M	420,33	690,66	496,33	851,66
Feedback	SD	192,57	207,44	223,62	258,11
Visual	M	381,33	559,33	474,66	710,01
Feedback	SD	156,49	156,94	208,49	210,01
Visual + Verbal	M	410,33	875,06	547,33	1231,01
Feedback	SD	181,45	114,57	286,34	217,45

Note: M = Mean score; SD = Standard Deviation

4.1. Dribbling Pre Test Results

A 3 × 2 (Group × Condition) ANOVA was used to analyse to test the difference in visual, verbal, and visual +verbal feedback condition. The results did not revealed statistically significant main effect between the groups during the pre test $F(2,42) = .195$ $p<.05$.Anova results for dribbling skill were presented in table 6. This result indicated that before the treatment the three feedback conditions were statistically not different from each other. Figure 5 indicated a graphical representation of the feedback conditions and their scores

Table 7

ANOVA values for dribbling skill

Source of Variations	*SS*	*df*	*MS*	*F*	*Sig of F*
		Pre test			
Between groups	12310.0	2	6155.0	,195	,823
Within groups	1323020,0	42	3150.0		
Total	1335330,0	44			
		Post test			
Between groups	754696,7	2	377348,3	14,012	,001
Within groups	1131075,6	42	26930,3		
Total	1885772 ,3	44			
		Total difference			
Between groups	642664.0	2	321332.0	46.18	,001
Within groups	292246.2	42	6958.2		
Total	934910.3	44			

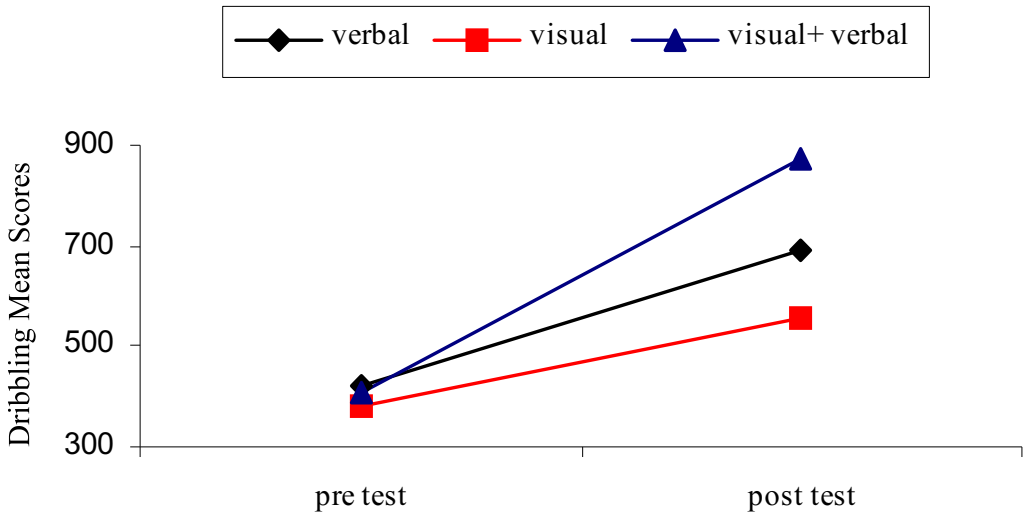


Figure 3: Dribbling Mean Scores of the groups During Pre Test and Post Test.

4.2. Dribbling Post Test Results

The ANOVA results for the dribbling post test revealed significant main effect for three feedback conditions, F(2,42) = 14,01 p<.0.5. ANOVA table for the dribbling post test was presented in table 8. Tukey's HSD follow up revealed statistically significant difference among the scores of verbal condition (M=690.66; SD=207.44) to both visual condition (M=559.33; SD=156.94), and visual + verbal condition (M=875.06; SD=114.57). Figure 5 shows the graphical representation of the mean scores of feedback condition in the post test.

4.3. Dribbling Total Difference Results

The ANOVA results for the total difference revealed statistically significant main effect for the conditions, F(2,42) = 46.18 p<.0.5. ANOVA table for the total difference scores was presented in Table 7. Tukey's HSD follow up revealed statistically significant difference among the scores of verbal condition (M=270.33;

SD=54.72) to both visual condition (M=178.00; SD=36.73), and visual + verbal condition (M=464.73; SD=128.57). These results showed that visual + verbal feedback condition has the largest improvement test scores but visual condition has the least improvement in dribbling skill. Figure 4 shows the total difference scores of the three feedback conditions as improvement scores

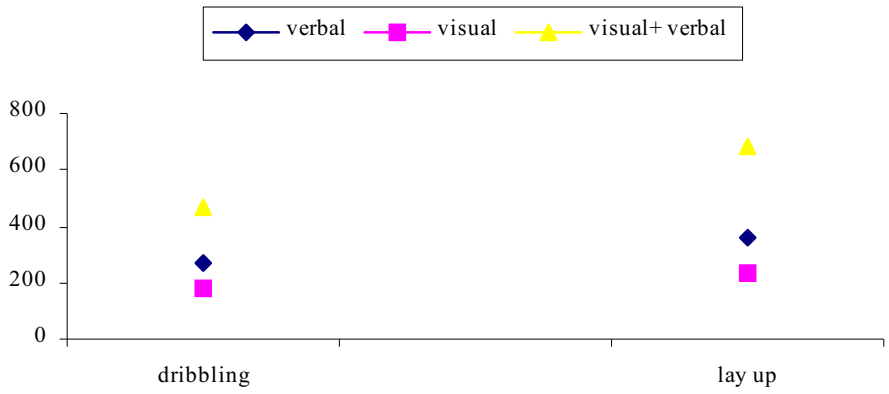


Figure 4: Dribbling and Lay up Total Difference Scores of the Three Feedback Groups

4.4. Lay Up Pre Test Results

A 3 × 2 (Group × Condition) ANOVA was used to analyse to test the difference in visual, verbal, and visual +verbal feedback condition. The results did not revealed statistically, significant main effect between the groups during the pre test $F(2,42) = .357$ $p<.05$. ANOVA results for lay up skill was presented in table 7. These results indicated that before the treatment the three feedback conditions were statistically not different from each other. Figure 5 indicated a graphical representation of the feedback conditions and their scores

Table 8

ANOVA values for lay up skill.

Source of Variations	*SS*	*df*	*MS*	*F*	*Sig of F*
		Pre test			
Between groups	41754,4	2	20877,2	,357	,702
Within groups	2456640,0	42	58491,4		
Total	2498394,4	44			
		Post Test			
Between groups	2177021.1	2	1088510.5	20.66	,000
Within groups	2212193.3	42	52671.2		
Total	4389214.4	44			
		Total Difference			
Between groups	1616027.8	2	808013.8	100.47	,000
Within groups	337770.0	42	8042.14		
Total	1953797.8	44			

4.5. Lay Up Post Test Results

The ANOVA results for the lay up post test revealed significant main effect for three feedback conditions, $F(2,42) = 20.66$ $p<.0.5$. ANOVA table for the lay up post test was presented in table 7. Tukey's HSD follow up revealed statistically significant difference among the scores of verbal condition (M=851.66; SD=258.11) to both visual condition (M=710.01; SD=210.01), and visual + verbal condition (M=1231.01; SD=217. Figure 5 shows the graphical representation of the mean scores of feedback condition in the post test.

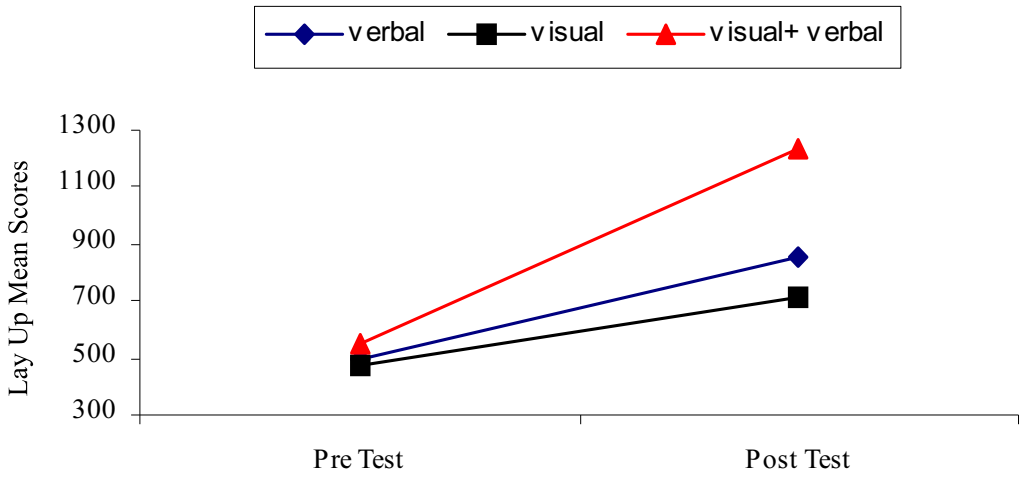


Figure 8: Lay Up Mean Scores During Pre Test and Post Test

4.6. Lay Up Total Difference Results

The ANOVA results for the total difference revealed statistically significant main effect for the conditions, $F(2,42) = 100.47$ $p<.05$. ANOVA table for the total difference scores was presented in Table 7. Tukey's HSD follow up revealed statistically significant difference among the scores of verbal condition (M=355.33; SD=66.12) to both visual condition (M=235.33; SD=67.94), and visual + verbal condition (M=683.66; SD=123.03). These results showed that visual + verbal feedback condition has the largest improvement test scores but visual condition has the least improvement in lay up skill. Figure 4 shows the total difference scores of the three feedback conditions as improvement scores.

CHAPTER V

DISCUSSION

This study examined the effect of different feedback conditions on the dribbling and lay up skills in basketball. The results of the study supported the first hypothesis that there were significant difference in the post test scores of verbal, visual + verbal and visual feedback groups. This difference caused by the verbal feedback group and the visual + verbal feedback group over the visual feedback group.

Burkhard, Patterson & Rapue, (1967) examined the effect of visual and verbal feedback to the learning of karate skills for 13 student at the average age of 15 years old. Students grouped with 6 and 7 subjects and they attended the karate courses during 9 weeks. One of the group received verbal the other group received visual (videotape) feedback. The results demonstrated that subjects in visual group who had the chance of watching their performance exhibited greater improvement than the verbal group. In conclusion the results indicates that visual feedback enhances the error detection capability of the learner and analysis the specific parts of the movement patterns.

Lozano, (1991) examined the effect of different feedback conditions on jumping skill in volleyball. Verbal feedback, visual feedback, no feedback and modelling were the conditions 33 male and 11 female at the age of 12 were attended

the study. The results of the study revealed that videotape feedback group had the highest scores than the other 3 groups. In conclusion VTFB was appropriate for the task that jumping skill was simple and the cognitive levels of the learners has the capability to understand the specific aspects of the jumping skill.

The effect of videotape feedback on the learning of tennis service by novice volleyball players was examined by Van- Wierimngen, Emmen, Bootsma, Hoogestyer & Whiting, (1985). The first group received modelling learning with videotape, the second group received videotape feedback and the third group attained as control group. All of the groups attended the 5 courses with 45 minutes. The results of the study revealed that there were no significant differences among the three groups on the learning of the tennis service. In conclusion the amount and the type of feedback depends on largely on the level of learner and the characteristics of the skill. The skill was difficult and the learners were novices. Novices could not detect the critical elements of the movement.

In Starkes et al.'s study, (1989) synchronise swimmers' four different vertical swimming positions was recorded and investigated. The subjects at the age of 17-22 were grouped and evaluated according to their ability level. First group received visual +verbal feedback the second group received only visual feedback and the third group only received verbal feedback. The subjects who were at the advance level performed the skills more correctly graphic than the intermediate level; subjects at the intermediate level performed the skills more correctly graphic than the beginning level. These results concludes VTFB benefits to the subject according to their ability levels that subjects at the higher level promote better than subjects at the lower level.

In the study Mclauglin's (1999), separated 47-university student in to three groups as subjects of the study. The effect of visual feedback by videotape and visual perception on the learning of the softball skill was examined. The results showed that the scores of the groups who received visual feedback or provided visual perception were higher than both the traditional and control group. University students have a higher understanding, error detection and error correction capability than the children. In this study VTFB has been more efficient than the other styles of learning.

In the study Selder & Del Rolan (1979), knowledge of performance using videotape replay was given to a group of 8 girls' aged 12-13. Learning to a beginning balance beam routine control group with 8 subjects was taught utilising conventional information feedback. Three U.S. Federation gymnastic judges assessed performance after four weeks and again after six weeks all subjects in the experimental group were judged to be at the associative learning stage. The data were analysed using a mixed repeated measures design with one between and one within subjects variables. A significant treatment effect and treatment by group interaction resulted. The experimental group was responsible for the bulk of the significance. It was concluded that the knowledge of performance with videotape replay in the associative learning stage was beneficial. The evidence indicates that VTFB depends on learning process, seeing one's own performance on video does not automatically accomplish the goals of feedback, it takes time for visual feedback to promote valuable cognitive effort.

On the other hand VTFB is not always beneficial. Ineffective use of VTFB for learning has been attributed to such variables as level of performer, type of skill or movement, instructor provided feedback and frequency of viewing. These and the other variables should be considered when using VTFB to increase motor skill learning. In the studies of Whiting (1989), and Rusell (1993), VTFB was not effective as the studies mentioned above.

Whiting (1989), examined the effect of visual feedback on the development of the tennis service skill. 22 subjects were separated into three groups. The first group was visual feedback teaching group, the second group was traditional teaching group and third group was control group. Five weeks teaching process was applied to three groups. Every course was 40 minutes; 30 minutes of the course was practice and 10 minutes of the course was watching the performance from videotape and analysis of tennis service technique. Results indicated that videotape feedback and traditional teaching group demonstrated much more improvement then the control group. On the other hand there was no statistically significant difference between the videotape feedback group and traditional teaching group.

Rusell (1993) examined the effect of traditional and videotape feedback method on the learning of hockey skills to the students at the age of 12. Subjects were separated into two groups with 15 students each. The results of the study demonstrated that there were significant differences between videotape and traditional feedback groups. Videotape feedback group had higher scores than traditional groups.

Most students cannot attend to critical task-related elements and effectively learn from VTFB. Hebert and Landin (1997) found that for a group of novice

learners, VTFB did not positively affect skill learning until after the first two days of viewing. Similar examples of age-related differences were found by Boyce, Markos, Jenkins, & Loftus, (1996). From a comparison of different forms of feedback (including teacher provided verbal feedback, VTFB, and feedback from peers) Boyce et al., (1956) discovered that teacher-provided verbal feedback was often the most effective for third graders learning sport skills. However, for fifth graders, more improvement occurred when they received VTFB rather than teacher-provided verbal feedback or peer feedback. Boyce et al.,(1956) and Hebert and Landin (1997) both suggest that beginners and younger students might be more dependent on teacher feedback and less able to process and use VTFB.

Perhaps the most important progression in VTFB is to detect the critical elements of the movement. Increased ability to detect movement errors is a characteristic of progress to the intermediate or "associative" stage of learning. VTFB research is very conclusive: in order to be effective, video must be supplemented with verbal or written information that directs the viewer's attention to those cues and techniques most important to successful performance (Boyce et al., 1996; Hebert & Landin, 1997). Learners in this stage begin to watch videos critically, but may often direct their attention inappropriately (e.g., by trying to assimilate the entire movement pattern at once, or focusing only on the outcome of the movement).

Because of this, students may easily become frustrated, lose motivation, or feel overwhelmed with VTFB. At this point, it is easy for instructors to assume that VTFB is not effective as an instructional method. A tendency is to abandon the use of VTFB based on the students' lost motivation or frustration. However, it is

important to realise that lowered motivation and enthusiasm typifies early stages of learning; with appropriate experiences, this condition is temporary. As students become more successful in identifying and fixing errors, motivation and enjoyment with VTFB are likely to increase.

Student motivation and enthusiasm for using VTFB is typically high. It is important to remember that students are at a stage of independence, and prefer learning that is structured as such. Students' motivation and improvement seem to be highest when they are able to take control of the learning process. A recent study by Janelle, Barba, Frehlich, Tenant, and Cauraugh (1997) compared groups of students receiving VTFB with different schedules of teacher feedback for learning a throwing task. A self-controlled group of students regulated their VTFB and teacher feedback on demand (dictated when they felt feedback was needed). Compared to a group of learners who received feedback on a rigid schedule (every fifth throw), the self-controlled group learned more successfully. The authors showed that when students were allowed to determine when VTFB was helpful, they required less feedback in order to improve than students whose learning process was more passive. Jambor and Weekes (1995) suggest that advanced learners become distracted by what the teacher thinks is important on the video rather than what they believe is significant. The findings of Janelle et al.(1997), are consistent with the well-established notion that motor skill learning is enhanced when the amount of feedback is decreased as the learner improves, so as to avoid a sense of dependency on the feedback (Magill, 1994, 1998).

The hypothesises of the study was supported by the literature. The movement pattern scores of visual + verbal feedback scores were higher than verbal feedback

group; and verbal feedback groups scores were higher than the visual feedback group.

The reason of the low scores in visual feedback group is that; VTFB may increase the motivation enthusiasm and effort in skill learning and highlights the most difficult aspects of specific movement patterns where as VTFB requires cognitive effort to comprehension of the visual feedback (especially for the children). When the visual feedback combined with the verbal explanations it makes sense for learning motor skill.

The second hypothesis of the study was that total difference scores of the verbal, visual + verbal and visual feedback conditions were different. The study supported the hypothesis that total difference scores of visual + verbal feedback scores were higher than verbal feedback group; and verbal feedback groups scores were higher than the visual feedback for both the dribbling and the lay up tasks.

Also the literature which was parallel with this study indicated that when the VTFB combined with the verbal cues or verbal feedback the improvement in the skill learning and performance became greater. Researches in these areas suggest that cognitive processes play an important role during the early stages of skill acquisition.

Verbal feedback is a common component of the communication between instructor and student in skill learning. Verbal feedback is necessary for learning some skills that it enables the learner to acquire the skill faster where as learner becomes dependent to the instructor and verbal feedback. If verbal feedback removed the performance or the improvement in skill acquisition becomes lower.

On the other hand the learning of the dribbling is lower than the learning of the lay up skill. The source of this difference is the nature of the skills. As it is

known dribbling is a continuous skill and lay up is discreet skill. On the learning of lay up skill feedbacks are more concrete and understandable however on the learning of dribbling skill the feedbacks are more complex and difficult to understand. For that reason children shoved greater improvement in lay up (discreet) skill.

CHAPTER VI

CONCLUSION

The notion that motor skill learning occurs in stages is popular in pedagogical and motor-learning literature (Christina & Corcos, 1989; Magill, 1998; Rink, 1998). Generally, the literature reveals that learners tend to pass through three distinct stages of motor learning. Various terms have been used to describe these stages (Magill, 1998). The beginning stage has been called the "cognitive," "getting the idea," or "coordination" stage. Learner characteristics in this stage include inconsistency in performance, gross movement errors, limited attention to relevant cues, and high levels of cognitive activity and self-talk. The intermediate stage, also termed the "associative" or "fixation/diversification" stage, is characterised by increased attention to relevant cues, increased ability to detect errors, decreased self-talk, increased confidence, and refinement of patterns. Finally, learners in the advanced stage, also called the "autonomous" or "control" stage, may experience automatically, exhibit more consistency, show good ability to detect and correct errors, and have limited, more positive self-talk and well-defined motor programs.

Magill (1998) suggests that these stages represent a continuum of practice, and that learners do not make abrupt shifts from one stage to the next. The learning process, when viewed as a gradual transition between stages, serves as an important basis for instructional strategies in physical education. It follows that a similar

approach can be applied to motor skill learning with VTFB. The use of VTFB for skill acquisition should be based on where the student is in the learning process.

Like many instructional methods, VTFB should be consistently implemented until mastery of a specific sport skill has been attained. Implementing VTFB only a few times may have little impact on skill learning due to the inability of students to process task-related information during the initial stage. VTFB should be integrated frequently with practice, rotating between specific video clips and teacher intervention, or practice trials. A poor use of VTFB would be to show a continuous 30-minute clip of the student performance with little or no practice or teacher intervention during the video. Instructors should show only one or two specific elements followed immediately by practice and repeat this process until instructional goals are met. It is unfair to expect students to remember or reproduce elements from long, continuous segments of VTFB.

Finally, instructors should understand that their role changes depending on the student's level of learning. The teacher's role evolves from one of familiarisation and generating interest, to one of direct instruction, to one of guidance and facilitation. Failure to understand the learner in VTFB may prevent the explicit purpose of using video technology in instruction: to enhance the learning process. Instructors should remember that, feedback should be given according to students understanding capacity and interest. The type of feedback does not play the main effect on the learning and performance.

Based on the findings of the study the following recommendation might be considered in the future studies.

1. Verbal feedback for the novice learners seems to be better than the visual feedback.
2. VTFB and verbal feedback should be used together to get the better learning and performance results.
3. Control group can be added to the design of the study for assessing the practice only effect.

4. Visual only feedback to an expert group can be given to asses the difference between the novice and expert group.

REFERENCES

Adams, J.A. (1968). Response feedback and learning. *Psychological Bulletin, 70,* 486-504.

Barlett, F. C. (1947). The measurement of human skills. *British Medical Journal, 14,* 835-838, 877-888.

Belisle, J. J. (1963). Accuracy, reliability, and refractoriness in a coincidence-anticipation task. *Research Quarterly, 34,* 271-281.

Bilodeau, I.M. (1966). Information feedback. In E.A. Bilodeau (Eds.), *Acquisition of skill* (pp.255-296). New York: Academic Press.

Bilodeau, E.A., & Bilodeau, I.M. (1958). Variable frequency knowledge of results and learning of a simple skill. *Journal of Experimental Psychology, 55,* 379-383.

Bilodeau, E.A., Bilodeau, I.M., & Schumsky, D.A. (1959). Some effects of introducing and withdrawing knowledge of results early and late in practice. *Journal of Experimental Psychology, 58,* 142-144.

Bjork, R.A. (1988). Retrieval practice and the maintenance of knowledge. In M. M. Gruneberg, P.E. Morris and R.N. Sykes (Eds.), *Practical aspects of memory II.* (pp. 396-401), London: Wiley.

Burkhard, G.D., Patterson, J. & Rapue, (1967). Effect of film feedback on learning the motor skills of karate. *Perceptual and Motor Skills, 25*, 65-69.

Bransford, J.D. (1979) *Human cognition: learning, understanding, and remembering.* Wadsworth Pub. Co.

Carver, S., & Scheier, M.R. (1990). Origins and functions of positive and negative affects: A control-process view. *Psychological Review, 97,* 19-35.

Chen, D. D., Hendrick, J. L., & Lidor, R. (2002). Enhancing self-controlled learning environments: the use of self-regulated feedback information. *Journal of Human Movement Studies,* 43, 69-86.

Chiviacowsky, S., & Wulf, G. (2002). Self-controlled feedback: does it enhance learning because performers get feedback when they need it? *Research Quarterly for Exercise and Sport, 73,* 408-415.

Clark, J.E. (1995). On becoming skillful: patterns and constraints. *Research Quarterly for Exercise and Sport, 66,* 173–183.

Corno, L., & Mandinach, E. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist, 18,* 88–100.

Corno, L., & Rohrkemper, M. (1985). The intrinsic motivation to learn in classrooms. In C. Ames & R. Ames (Eds.), *Research on motivation: The classroom milieu* (vol. 2, pp. 53–90). New York: Academic Press.

Derry, S.J., & Murphy, D.A. (1986). Designing systems that train learning ability: From theory to practice. *Review of Educational Research, 56,* 1-39.

Fitts, P.M. (1954). The information capacity of the human motor system in controlling the amplitude of movement. *Journal of Experimental Psychology, 47,* 381-391.

Garner, R. (1990). When children and adults do not use learning strategies: Toward a theory of settings. *Review of Educational Research, 60,* 517-529.

Gibson F. Darden. (1999) Videotape Feedback for Student Learning and Performance: A Learning-Stages Approach.***The Journal of Physical Education, Recreation & Dance***, Nov , 70, 9-40.

Glencross, D.J. (1994). Human skill and motor learning: A critical review. *Sport Science Review, 1,* 65–78.

Heymen, N., Leve, W., Lindauer, R & Schute,H.(1987).Zur Wirksankeit von verbal visueller rueckmeldung im Sportunterricht Einuntersuchungsbericht. *Spotunterricht*, Aug. 293-298.

Holding, D.H. (1976). *The principles of training.* Oxford: Pergamon Press.

Holt, J. (1982). *How children fail.* De Lacorte Press, New York.

Janelle, C.M., Barba, D.A., Frehlich, S.G., Tennat, L.K., & Cauraugh, J.H. (1997). Maximizing performance effectiveness through videotape replay and a self-controlled learning environment. *Research Quarterly for Exercise and Sport, 68,* 269-279.

Janelle, C.M., Kim, J., & Singer, R.N. (1995). Subject-controlled performance feedback and learning of a closed motor skill. *Perceptual and Motor Skills, 81,* 627-634.

Kirschenbaum, D.S., & Witrock, D.A. (1984). Cognitive-behavioral interventions in sport: A self-regulatory perspective. In J.M. Silva & R.S. Weinberg (Eds.), *Psychological foundations of sport* (pp.81-90). Champaign, IL: Human Kinetics.

Kluka, D.A. (1999). *Motor behavior form learning to performance.* Morton Publishing, Englewood.

Kottke, F.J., Halpern, D., Eastron, J.K., Ozel, A.T., & Burrill, B.S. (1978). The training of coordination. *Archives of Physical Medicine and Rehabilitation Medicine, 59,* 567-572.

Lavisse, D., Deviterne, D., & Perrin, P. (2000). Mental processing in motor skill acquisition by young subjects. *International Journal of Sport Psychology, 31,* 364–375.

Lee, T.D. (1988). On the dynamics of motor learning research. *Research Quarterly for Exercise and Sport, 69,* 334-337.

Lefebvre-Pinard M., & Pinard, A. (1985). Taking charge of one's cognitive activity: a moderator of competence. In E.D. Neimark , R. De Lisi, & J.L. Newman (Eds.), *Moderators of competence* (pp.191-211). Hillsdale, NJ: Erlbaum.

Lidor, R., Tennant, K.L., & Singer, R. (1996). The generalizability effect of three learning strategies across motor task performances. *International Journal of Sport Psychology, 27,* 23–36.

Lozano, A.A.F.(1991). Efeitos da apresentacao do feedback atreves do videotape adiciondo a demostracao na. Aprendizagem do saque de voleibol. *Univarsidade Estandual Povliste, Rio Claro.* 53.

Magill, R.A. (2001a). Augmented feedback in motor skill acquisition. In R.N. Singer, H.A. Hausenblas & C.M. Janelle (Eds.), *Handbook of Sport Psychology* (pp.86-114). New York: Wiley.

Magill, R.A. (2001b).*Motor learning: concepts and applications* (6th ed.). Mc Graw Hill, New York.

Magill, R. A., Chamberlein, C. J., & Hall, K. G. (1991). Verbal knowledge of results as redundant information for learning an anticipation timing skill. *Human Movement Science, 10,* 485-507.

Masson, M.E.J. (1990). Cognitive theories of skill acquisition. *Human Movement Science, 9,* 221-239.

McLauglin, E.J.(1999). Effects of a web based intervention program on the acquisition of knowledge and visual recognition of critical elements and the precision of feedback for selected sports skills, *Doctoral Thesis, University of Northern Colorado.*

Newell, K.M. (1974). Knowledge of results and motor learning. *Journal of Motor Behavior, 6,* 235-244.

Newell, K.M., & Barclay, C.R. (1982). Developing knowledge about action. In J.A.S. Kelso & J.E. Clark (Eds.), *The development of movement control and co-ordination* (pp.175-212). New York: Wiley.

Newell, K.M., Morris, L.R., & Scully, D.M. (1985). Augmented information and the acquisition of skill in physical activity. In R.L. Terjung (Eds.), *Exercise and Sport Science Reviews* (Vol:13, pp.235-261). Lexington, MA: Collamore Press.

Osgood, C.E. (1949). The similarity paradox in human learning: A resolution. *Psychological Review, 56,* 132,143.

Penman, K.A., Bartz, D., & Daris, R. (1968). Relative effectiveness of instanat replay video tape recorder in teaching trampoline, *Research quarterly for exercise and sport, 33,* 1060-1062.

Pinanrd, A. (1992). Metaconsciousness and metacognition. *Canadian Psychology, 33,* 27-41.

Ramella, R.J. (1984). Effects of knowledge of results on anticipation timing by young children. *Perceptual and motor skills, 59,* 519-525.

Ramella, R., & Wiegand, R. (1983). Importance of the post-knowledge delay interval on transit reaction. *Perceptual and Motor Skills, 57,* 303-307.

Rikli,R. & Smith, G. (1980). Videotape Feedback Effects on Tennis Serving From. Perceptual and Motor Skills, 50, 895-901.

Rosenbaum, D.A. (1980). Human movement initiation: Specification of arm, direction, and extent. *Journal of Experimental Psychology: General, 109,* 444-474.

Russel, D. (1993) The effects of prototypic examples and video reply on adolescent girls' acquisition of basic field hockey skills. Master Thesis, University Of British Colombia.

Roy, E.A. (1976). Measuring change in motor memory. *Journal of Motor Behavior, 8(4),* 283-287.

Sage, G. H. (1977). *Introduction to motor behavior: a neuropsychological approach* (2nd ed.). Addison-Wesley Publishing (p.1-9).

Salmoni, A., Schmidt, R.A., & Walter, C.B. (1984). Knowledge of results and motor learning: A review and critical reappraisal. *Psychological Bulletin, 95,* 355-386.

Selder, D.J & Del Rolan, N. (1979). Knowledge of performance skill Level and Performance on a balance beam. *Canadian Journal of Applied Sport Science. 4*, 236-229.

Schmidt, R.A. (1975). A schema theory of discrete motor skill learning. *Psychological Review, 82,* 225-260.

Schmidt, R.A. (1988). *Motor Control and Learning: A Behavioral Emphasis* (2nd ed.) Champaign, IL: Human Kinetics.

Schmidt, R.A., & Gordon, E.B. (1977). Errors in motor responding, "rapid" corrections, and false anticipations. *Journal of Motor Behavior, 9,* 101-111.

Schmidt, R.A., & Lee, T.D. (1999). *Motor control and learning: a behavioral emphasis* (3rd ed.). Human Kinetics, Champaign, IL.

Schmidt, R.A., & Wrisberg, C.A. (2000). *Motor learning and performance: a problem-based learning approach* (2nd ed.). Human Kinetics, Champaign, IL.

Schmidt, R.A., & Young, D.E. (1987). Transfer of movement control in motor skill learning. In S.M. Cornier & J.D. Hegman (Eds.), *Transfer of learning* (pp47-79). Orlando, FL: Academic Press.

Schmidt, R.A., Young, D.E., Swinnen, S. & Shapiro, D.E. (1989). Summary knowledge of results for skill acquisition: support for the guidance hypothesis. *Journal of Experimental Psychology: Learning, 15,* 352-359.

Schunk, D.H. (1996). Goal and self-evaluative influences during children's cognitive skill learning. *American Educational Research Journal, 33,* 359-382.

Schutz, R.W. & Roy, E.A., (1973). Absolute error: The devil in disguise. *Journal of Motor Behavior, 5(3),* 141-153.

Seigler, R.S. (1988). Individual differences in strategy choice: Good students, not-so-good students, and perfectionists. *Child Development, 59,* 833-851.

Seigler, R.S. (1991). *Children's Thinking* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Sewall,L. P., Reeve, T.G. & Day, A. R., (1988). Effects of Concurrent Visual Feedback on Acquisition of weight lifting skill. *Perceptual and Motor Skills, 67*, 715-718.

Sherwood, D.E. (1988). Effect of Bandwidth knowledge of results on movement consistency. *Perceptual and Motor Skills, 66,* 535-542.

Singer, R.N., (1988). Strategies and metastrategies in learning and performing self-paced athletic skills. *The Sport Psychologist, 2,* 49-68.

Singer, R.N. (2000). Performance and human factors: considerations about cognition and attention for self-paced and externally-paced events. *Ergonomics, 43(10),* 1661-1680.

Singer, R.N., & Chen, D. (1994). A classification scheme for cognitive strategies: implications for learning and teaching psychomotor skills. *Research Quarterly for Exercise and Sport, 65,* 143-151.

Singer, R., Lidor, R., & Cauraugh , J.H. (1993). To be aware or not aware? What to think about while learning and performing a motor skill. *The Sport Psychologist, 7,* 19-30.

Singer, R.N. & Suwanthada, S. (1986). The generalizability effectiveness of a learning strategy on achievement in related closed motor skills. *Research Quarterly for Exercise and Sport, 57,* 205-214.

Slatter-Hammel, A. T. (1960). Reliability, accuracy, and refractoriness of a transit reaction. *Research Quarterly for Exercise and Sport, 31,* 217-228.

Spray, J.A. (1986). Absolute error revised: an accuracy indicator in disguise. *Journal of Motor Behavior, 18(2),* 225-238.

Starkes, L., Gabrielle, L., & young, L. (1989). Performance of the vertical position in synchronised swimming as a function of skill, proprioceptive and visual feedback, Perceptual and motor Skills 69, 225-226

Swinnen, S.P. (1996). Information feedback for motor skill learning: a review. In H.N.Zelaznik (Eds.), *Advances in motor learning and control* (pp.37-66). Human Kineics, Champaign, IL.

Swinnen, S.P., Schmidt, R.A., Nicholson, D.E., & Shapiro, D.C. (1990). Information feedback for skill acquisition: Instantaneous knowledge of results degrades learning. *Journal of Experimental Psychology: Learning, 16,* 706-716.

Van-Wieringen, P.C.W.,Emmen, H.H., Bootsma, R.J., Hoogestyer, M. & Whiting, H.T.A. (1989). The effect of video- feedback on the learning of the tennis service by novices. *Journal of Sport Sciences Summer, 3 (2*), summer 1985, 127-138.

Van-Wieringen, P.C.W.,Emmen, H.H., Bootsma, R.J., Hoogestyer, M. & Whiting, H.T.A. (1989). The effect of video- feedback on the learning of the tennis service by intermediate players. *Journal of Sport Sciences Summer, 7 (2*), Summer, 153-162

Vealey, R.S., Hayashi, S.W., Garner-Holman, M., Giacobbi, P. (1998). Sources of sport-confidence: Conceptualization and instrument development. *Journal of Sport & Exercise Psychology, 20,* 54-80.

Winstein, C.J., & Schmidt, R.A. (1990). Reduced frequency of knowledge of results enhances motor skill learning. *Journal of Experimental Psychology: Learning 16,* 677-691.

Wulf, G., Lee, T.D., & Schmidt, R.A. (1994). Reducing knowledge of results about relative versus absolute timing: Differential effects on learning. *Journal of Motor Behavior, 26,* 362-369.

Wulf, G., Shea, C.H., & Matschiner, S. (1998). Frequent feedback enhances complex motor skill learning. *Journal of Motor Behavior, 30,* 180-192.

Young, D.E., & Schmidt, R.A. (1992). Augmented kinematic feedback for motor learning. *Journal of Motor Behavior, 24,* 261-273.

APPENDICES

APPENDIX A

DRIBBLING AND LAY UP SKILL EVALUATION CHARTS

DRİBBLİNG DEĞERLENDİRME ÖLÇEĞİ

A-TOP KONTROLÜ	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Top önde dribbling yapıyor										
2) Topa bakmıyor										
3) Top avuç içine değmeden, parmak ucuyla dribling yapıyor										
4) Önce dirsek sonra el bileğinden top yere bir açı ile itiyor (top sürme tekniği)										
Toplam										
Genel Toplam										

B- ADIMLAMA	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Dizler bükük şekilde adımlama yapıyor										
2) Ayaklar çok açmıyor										
3) Ayak uçları karşıya bakıyor										
4) Dizler öne doğru bir açı yapıyor										
Toplam										
Genel Toplam										

C-VÜCUT POZİSYONU	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Ağırlık merkezini kalçada tutuyor										
2) Vücut öne eğik şekilde hareket ediyor										
3) Kafa ve omuz yukarıda karşıya bakıyor										
Toplam										
Genel Toplam										

D-KORDİNASYON	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Dizlerden tüm vücut hafifce yaylanıyor										
2) Vücut serbest olarak hareket ediyor (kasılmasız)										
Toplam										
Genel Toplam										

TURNİKE DEĞERLENDİRME ÖLÇEĞİ

A- ADIMLAMA	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Topu karın hizasında tutuyor										
2) Sağ turnikeye girerken sağ ayak ile harekete başlıyor										
3) İki adım atıyor										
4) Dizler öne doğru açı yapacak şekilde yere temes ediyor										
Toplam										
Genel Toplam										

B- SIÇRAMA	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Diz karna doğru çekiliyor										
2) Sıçrama ayağını düz (gergin) tutuyor										
3) Vücut (bel) gergin tutuyor										
4) Kafa çembere bakıyor										
5) En yüksek noktaya ulaşmaya çalışıyor										
Toplam										
Genel Toplam										

C-TOPU BIRAKMA	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
Gözlenecek Davranışlar	1	2	3	4	5	6	7	8	9	10
1) Vücut çembere doğru uzanıyor										
2) Kol yukarıda düz (gergin) tutuluyor										
3) Topu karın hizasından yukarı doğru çıkartıyor										
4) Topu bırakırken avuç içi kendisine bakıyor										
5) Bileği kendine doğru çekiyor (bombe vermek için)										
6) Omzu çembere doğru hafifce dönüyor										
Toplam										
Genel Toplam										

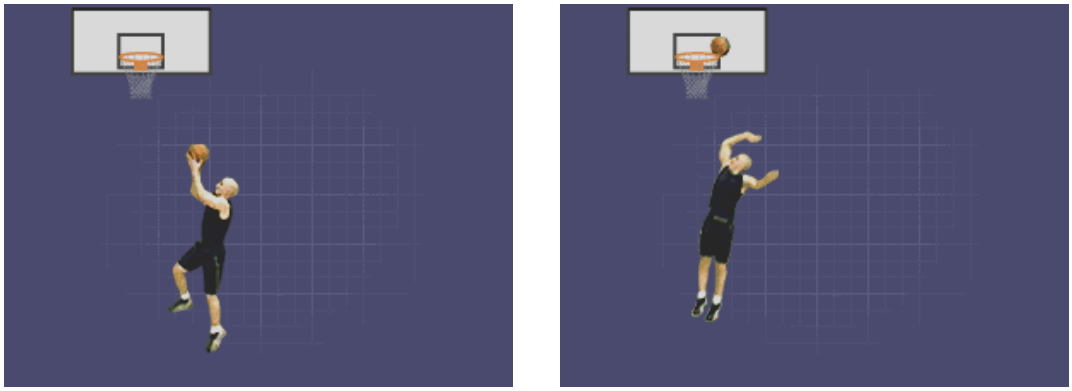
D-YERE DÜŞÜŞ	**Çok zayıf**		**Zayıf**		**Orta**		**İyi**		**Çok iyi**	
	1	2	3	4	5	6	7	8	9	10
1) Sıçranılan ayak ile yere düşüyor										
2) Denge için kolları aşağı çekiyor										
3) Yere düşüşte dizini hafifçe büküyor										
Toplam										

APPENDIX B

FIGURES OF DRIBBLING AND LAY UP SKILLS

a

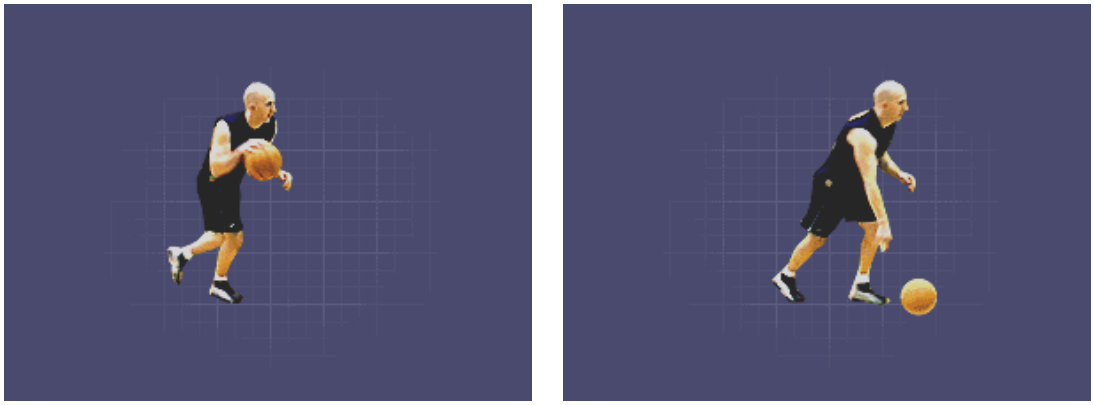
b



c d

Figure 8: Picture of Lay Up Skill

a b



c d

Figure 9: Picture of Dribbling Skill

APPENDIX C

INSTRUCTIONS TO PARTICIPANTS IN STUDY

Instructions to Participants during Pre Test

Instruction far all Groups

Firstly you are grouped with 5 persons and as participants you are asked to dribble the ball around the 10 meters away cones. You are going to perform this movement 5 times. Then you are going to give the ball to the next person in your group. S/He will perform the same dribbling movement 5 times than going to give the ball to the next subject. This process will continue until the last subject in your group. Then the first subject is going to perform the task again 5 times and the next subjects going to perform 5 times and this activity will go on like that. You are going to perform this task one more 5 times and your duties will be finished for today. Totally you are going to perform the task 3 times 5 tour dribble (15 times) around the cones.

Instructions to Participants during Acquisition

Visual feedback group: you are as subjects grouped in three with 5 persons You are the first group going to perform the dribbling / lay up task 5 times than you are going to go to watch your own performance from the TV. While you are watching your performance from the TV the other 5 person (second group) going to perform the dribbling / lay up task meanwhile the third group going to sit in gym and play game. When the second group watching their performance the third group going to perform the dribbling / lay up task. As the time third group finished the dribbling / lay up task, they will watch their own performance from the TV. Then the first group going to start to perform the task meanwhile the second group going to sit in the gym and

play game with each other. This process will go on three times during the process I will go to give direction for the process of task.

Verbal feedback group: you are as subjects grouped in three with 5 persons You are the first group going to perform the dribbling / lay up task 5 times than you are going to go to receive feedback from the instructor one by one. While you are receiving feedback from the instructor 5 person of second group going to perform the dribbling / lay up task meanwhile the third group going to sit in gym and play game. When the second group receiving their feedback from the instructor the third group going to perform the dribbling / lay up task. As the time third group finished the dribbling / lay up task, they will receive feedback from the instructor. Then the first group going to start to perform the task meanwhile the second group going to sit in the gym and play game with each other. This process will go on three times during the process I will go to give direction for the process of task.

Visual + Verbal feedback group: You are as subjects grouped in three with 5 persons. You are the first group going to perform the dribbling / lay up task 5 times than you will receive feedback from the instructor and watch your performance from the TV one by one. While you are receiving feedback from the instructor and TV, 5 person of second group going to perform the dribbling / lay up task meanwhile the third group going to sit in gym and play game. When the second group receiving their feedback from the instructor and watch their performance from TV, the third group going to perform the dribbling / lay up task. As the time third group finished the dribbling / lay up task, they will receive feedback from the instructor and TV. Then the first group going to start to perform the task meanwhile the second group

going to sit in the gym and play game with each other. This process will go on three times during the process I will go to give direction for the process of task. Figure 10 explains the process of the study for groups, feedback, task and play rotation.

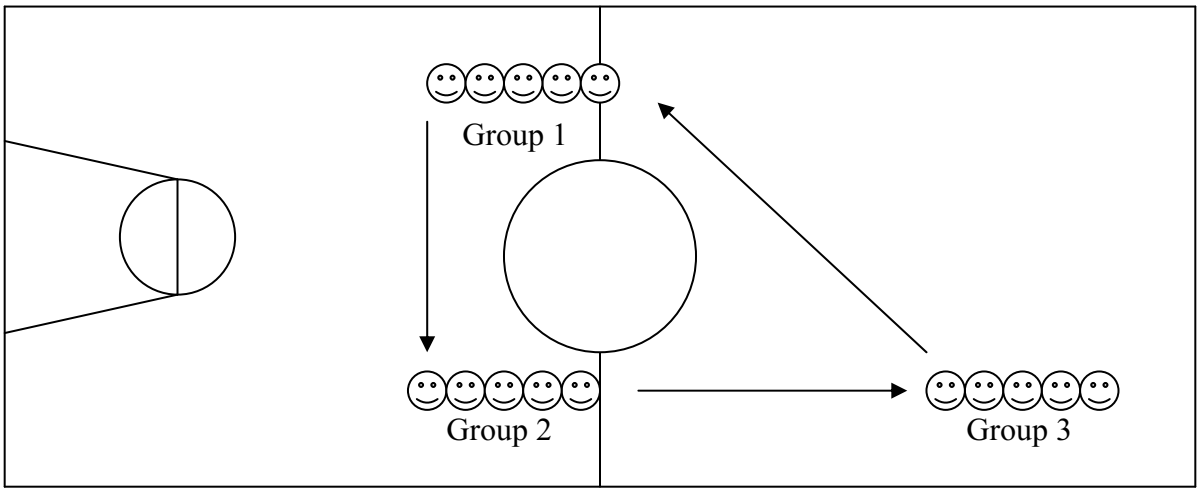


Figure: Rotation of Task Feedback and Play for A Feedback Group

In the process while the first group performing the task the second group is receiving the feedback and the third group is playing game. And rotation is shown in the figure 10 by the arrows.

Instructions to Participants during Post Test

Instruction for all Groups

Firstly you are grouped with 5 persons and as participants you are asked to dribble the ball around the 10 meters away cones/ lay up skill. You are going to perform this movement 5 times. Then you are going to give the ball to the next person in your group. S/He will perform the same dribbling /lay up movement 5 times than going to give the ball to the next subject. This process will continue until the last subject in your group. Then the first subject is going to perform the task

again 5 times and the next subjects going to perform 5 times and this activity will go on like that. You are going to perform this task one more 5 times and your duties will be finished for today. Totally you are going to perform the task 3 times 5 tour dribble (15 times) around the cones.

APPENDIX D

FEEDBACKS FOR DRIBBLING AND LAY UP SKILL

ÖĞRETMENİN DRİBBLİNG BECERİSİNDE ÖĞRENCİLERE SAĞLADIĞI DÖNÜTLER

A- TOP KONTROLÜ

1) Topu yere daha kuvvetli itmelisin
2) Top önde dribbling yapman gerekiyor
3) Topa değil karşıya bakmalısın
4) Avuç içinin topa temas etmemesi gerekiyor
5) Önce dirsek sonra el bileğinden topu yere dik olarak itmelisin

B- ADIMLAMA

1) Dizler bükük şekilde adımlama yapmalısın
2) Ayaklarını çok fazla açmamalısın
3) Top sürerken ayak uçları karşıya bakmalı
4) Dizlerden öne doğru bir açı yapmalısın

C- VÜCUT POZİSYONU

1) Ağırlık merkezini kalçada tutmalısın
2) Vücut öne eğik şekilde hareket etmelisin
3) Kafa ve omuz yukarıda karşıya bakmalı

D- KOORDİNASYON

1) Ters el topu korumalı
2) Dizlerden tüm vücut hafifce yaylanmalı
3) Vücut serbest olarak hareket etmelisin (kasılmasız).

ÖĞRETMENİN TURNİKE BECERİSİNDE ÖĞRENCİLERE SAĞLADIĞI DÖNÜTLER

E- ADIMLAMA

6) Topu karı hizasında tutmalısın
7) Sağ turnikeye girer iken sağ ayak ile harekete başlamalısın
8) İki adım atmalısın
9) Hangi ayak ile başlarsan o ayak ile bitirmelisin
10) Dizlerin öne doğru açı yapacak şekilde yere temes etmeli

B- SIÇRAMA

5) Dizlerini karna doğru çekmelisin
6) Sıçrama ayağını düz (gergin) tutmalısın
7) Vücudunu (belini) gergin tutmalısın
8) Çembere kafan çembere bakacak şekilde bakmalısın

C- TOP BIRAKAMA

4) Vücudun çembere doğru uzanmalı
5) Kolunu yukarıda düz (gergin) tutmalısın
6) Topu karın hizasından yukarı doğru çıkartmalısın
7) Topu bırakırkenn avuç içi kendine doğru bakmalı
8) Bileğini kendine doğru çekmelisin (bombe vermek için)
9) Omzunu çembere doğru hafifce döndürmelisin

D- YERE DÜŞÜŞ

3) Sıçranılan ayak ile yere düşmelisin
4) Denge için kolları aşağı çekmelisin
3) Yere düşüşte dizini hafifce bükmelisin