

## **Comparison of self-regulated and instructor-regulated feedbacks on acquisition and retention of throwing skill in basketball's lay-up shot**

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### **ABSTRACT**

*The aim of this study was comparison of self-regulated and instructor-regulated feedbacks on acquisition and retention of throwing skill in basketball's lay-up shot. The research subjects consisted 30 girl students 11 to 13 years old right-handed and beginner who were randomly selected and divided into two groups. Self-regulated group received feedback based on need but the other group received feedback based on control by instructor. In this research was used prescriptive verbal feedback. Subjects performed 60 trials in acquisition stage over two days and a week later performed 10 trials in retention and 10 trials in transfer test. To analyze the data obtained in the descriptive statistics, measures of central tendency and dispersion measures of the dependent variable was the experimental group and in Inferential statistics, variance analysis (Series training trials)  $6 \times (\text{type of feedback}) 2$  for the acquisition, retention and transfer to the independent t-test was used. Result indicated no significant difference between self-regulated and instructor-regulated groups in acquisition stage, but self-regulated feedback group had better performance in retention and transfer tests than instructor-regulated feedback group. So we concluded that subjects self determination in time of feedback reception can be advantage and feedback schedule based on subject-regulated method is more effective than instructor-regulated method. Also self-regulated feedback is useful for complex skills in field conditions.*

**Key words:** Self-Regulated feedback, Instructor-Regulated feedback, Acquisition, Retention, Transfer test.

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### **INTRODUCTION**

One of the important responsibilities of physical education teachers and trainers is to help novices acquire motor skills. Therefore, determining exercise conditions which optimize learning of motor skills has always been one of the important objectives of researches on learning of human motor skills [2]. Undoubtedly, one of the most important learning processes is use of feedback in acts which are done during exercise [19]. All researches performed on importance of role of feedback in learning motor skills concluded that feedback helps learner, and increases reaction speed of learner, however, there is no consensus on which of these has a more effective role [16]. There no doubt that augmented feedback has an effective role in learning complex motor skills. According to the research conducted by Sanchez and Bampouras (2006) and Adam (2012), providing feedback improves learning of complex motor skills, however, what is challenging is the manner in which it is provided. The weakness of previous researches was excessive emphasis on the teacher or instructor and lack of emphasis on the role of learner, so that Chen and Singer (1992) suggested that an ideal guideline from instructor would be for the learners to use approaches which are under their control, so that they could be compatible with requirements of their situation and their performance background. Researchers believe that adoption of this approach enables learner to be more actively involved in determining the specifications of exercise [16]. Hence the self-regulated feedback, self-regulating is a

relatively new top in motor learning, and means receiving feedback by the subject when required [4]. Logically, self-controlled perception is achieved when augmented feedback is only provided upon request of learner, which may result in development of effective approaches for learning cognitive and motor skills [21]. According to evidence of experiment of Janelle (1997), if learner can take part in determination of specifications of exercise more actively, this will result in improvement of learning of complex motor skills. Similarly, Janelle, Kim and Singer (2001) showed in a research that participants showed a significantly better performance in retention trial under self-regulated conditions compared with instructor-regulated group and control group. Also, the results of researches by Chiviacowsky and Wulf (2002,2005) showed that self-regulated feedback was especially more efficient after successful trials. Wulf (2005) obtain positive results regarding self-regulated feedback in retention and transfer status, although they didn't find any difference with instructor group in the stage of acquisition. In another research by Chiviacowsky (2008), who performed a research on advantages of self-controlled feedback knowledge of performance that self-regulated group had a better overall performance in throwing darts. In another research, which must be conducted on effect of self-controlled feedback during motor learning, the results showed that instructor-regulated group and self-controlled group were able to produce efficient learning effects, although they didn't have the provision to make feedback request unlike self-controlled group [10]. Adam (2012) conducted a research on effects of self-controlled video feedback on learning basketball shot and found out that this feedback had an effect on learning complex motor skills. For learning motor skills, Kolovelonis (2012) conducted a research on novice subjects and found out that self-regulated feedback was effective. Also, in a research by Fairbrother (2012), effect of self-controlled feedback on motor learning was stressed. Another research by Sadeghi (2009) studies effects of self-controlled feedback on novice children aged 10 and 11 in learning dart throwing skill. The results showed that children obtained better results under successive instructor-regulated exercise conditions. Given the fact that in teaching motor skills, one of the important variables of learning speed, cost and time, is proper provision of various feedbacks, therefore, in this research, we intend to test effect of self-regulated feedback on a complex motor skill field conditions (non-experimental). In fact, we intend to find out what effects self-regulated and instructor-regulated feedbacks have on acquisition, retention and transfer and which is the superior feedback in instructing complex skills and the question which condition is a more ideal environment for acquisition, retention and transfer of motor skills, the one in which the plan is fully dependent on the request of the subjects is or the one in which feedback plan is predetermined by instructor.

The present research can help instructors and teachers in improvement of development of exercise methods which they design on self-regulated or instructor-regulated bases and make exercise session more efficient. Finally, the present research tries to answer the question if there is a difference between effect of self-regulated and instructor-regulated feedbacks on acquisition, retention and transfer of basketball's lay-up shot?

## MATERIALS AND METHODS

**Participants:** The population were 50 girls student aged between 11-13 years, right handed and beginner. The sample of this study comprised 30 girls student who were randomly selected after completing individual questionnaire by researcher and divided into two groups: self-regulated group (N=15) and instructor-regulated group (N=15). Both of groups were matched. Matching indices include issue such as: gender, month and year of birth, length, weight, handedness and being a beginner in basketball. Participant's task was to throw basketball's lay-up shot.

**Apparatus:** In this study, checklist points were used for any number of trials in acquisition, retention and transfer phases. This study was conducted in a basketball field. Tools used, a standard basketball ball, a basketball board with a basket, the basket's height (3.05) from the ground is and a diameter of (45 cm), that the targets were used.

**Procedure:** The method of this study was Quasi experimental. Subject's performed 60 trials in acquisition phase over two days (each day: 3 blocks of 10 trials), and as for the type of motor skill, a week later performed 10 trials in retention and 10 trials in transfer test without providing feedback. The acquisition and retention tests were done on the right side and in transfer test was performed in the middle of side. At first, information on how to perform the task to the learner were provided, this information included how to perform the task, the number of trials and the information content of the feedback, also from the participants were asked that do not speak about the content of feedback, then showed them how to perform the throwing basketball's lay-up shot and each of learner performed 5 trials testable to understand how to perform the skill, finally learner performed the main trials. In this study was used prescriptive verbal feedback because the sample was comprised of beginners. Self-regulated group received feedback based on need but the other group received feedback based on control by instructor. Feedback frequency was similar for both of groups.

Assessment method of throwing basketball's lay-up shot have been according to several books on teaching basketball techniques, it was also confirmed by experts. The scoring method (5/3/2/1/0) according the study wulf (2005) conducted. It is noteworthy that this method before this study was done as pilot.

Assessment method: If basketball's lay-up shot is performed with proper order of steps, timely extension of shooter's hand (right hand) toward the correct target (square-shaped target on the board) and proper angled movement of wrist and correct positioning of hands and feet after shot in such a manner that shooter's hand is extended following the ball until the last minute and the bent foot become straight and landing is performed using both feet and also the ball is placed in the basket, five points will be considered and if the ball is not placed in the basket, three points will be recorded. In case the first stages of shot were correct, but positions of hands and feet after shot were not correct in such manner that shooter's hand did not extend following the ball and the landing was not performed using both feet, two points were considered. If the shot was performed with proper order of steps, but shooter's hand (right hand) was not extended toward the correct target (square-shaped target on the board) on a timely basis, and angled movement of hand's wrist was not performed, one point was considered. Shots that did not have any of the essential components of basketball's lay-up shots, no points were considered.

Statistical analysis: To analysis the data obtained in the descriptive statistic, measures of central tendency and dispersion measure and inferential statistic was used variance analysis (series training trials) $6 \times$  (type of feedback) $2$  for the acquisition and for retention and transfer phases was used Independent t test. The normality of the data has been assessed by Kolomogrov-Smirnov test and for equality of variances between groups is used Leven-test. All of the Statistical analysis were administered using SPSS version 20. The significance level of ( $p > 0.05$ ) was considered.

## RESULTS

As it was previously mentioned, both groups had been matched. Table 1 shows the mean and standard deviation age, length and weight.

**Table 1. Mean and standard deviation of the subjects' age, length and weight**

Groups	Age mean and Std. deviation	Length mean and Std. deviation	Weight mean and Std. deviation
Self-regulated group	11.8 $\pm$ 0.55	155.14 $\pm$ 4.27 cm	41.49 $\pm$ 3.66 kg
Instructor-regulated group	11.79 $\pm$ 0.62	155.18 $\pm$ 3.46 cm	41.50 $\pm$ 2.82 kg

Table 2 shows by using analysis variance in acquisition phase, is no significant difference between self-regulated feedback group and instructor-regulated feedback group ( $F=0.059$ ,  $P=0.808$ ), but according to the result analysis of variance related to the scores mean shows significant difference between series training trials in acquisition phase in two groups ( $F=154.9$ ,  $P=0.00$ ).

**Table 2. Variance analysis related to the acquisition phase**

Source of variability	Degree of freedom	F	Sig
Feedback groups	1	0.059	0.808
Series of trial	5	154.907	0.00
Groups*series of trial	5	0.086	0.686

Table 3 shows significant difference between two groups by using independent T-test in retention and transfer phases, so this result showed that self-regulated feedback group had better performance than instructor-regulated feedback group in retention and transfer phases.

**Table 3. Independent t-test related to retention and transfer phases**

Tests	t	Degree of freedom	Sig	Mean difference
Retention	4.753	28	0.00	0.57
Transfer	4.926	28	0.00	0.62

According to figure 1, is no significant difference between self-regulated feedback group and instructor-regulated feedback group in 6 series training trials in acquisition phase, nevertheless that between series training trials is significant difference in two groups. Lowest score is in the first trial and highest score is in the sixth trial in both groups. Self-regulated group had better performance in retention and transfer phases.

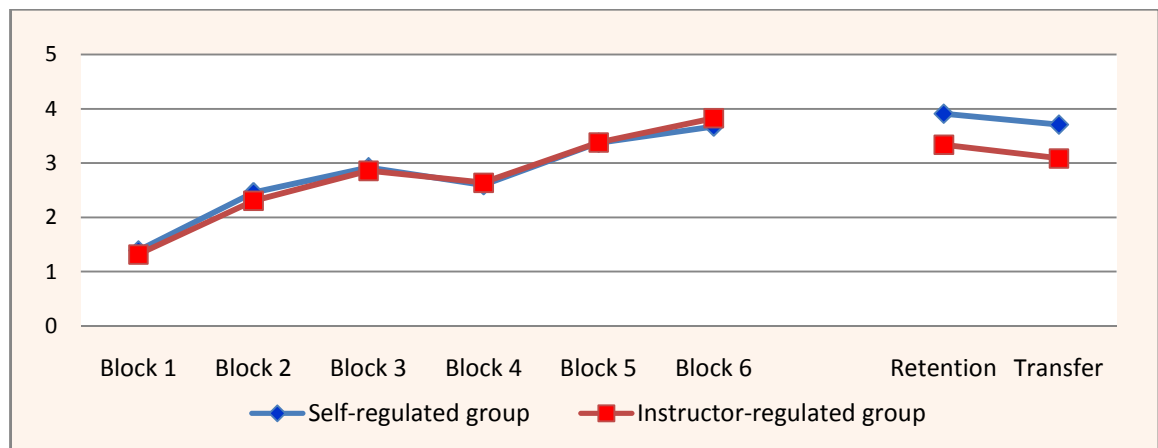


Figure 1. The line graph of skill mean of study groups in acquisition, retention and transfer phases

## DISCUSSION

This research aims to study self-regulated and instructor-regulated feedbacks in three stages of acquisition, retention and transfer of basketball's lay-up shot and to determine the effect of these two types of feedback on these three stages. The results of the present research in acquisition stage showed that there was no difference between effect of self-regulated and instructor-regulated feedbacks on acquisition of basketball's lay-up shot, despite there was a difference between self-regulated and instructor-regulated feedbacks trial series in acquisition stage. The results from acquisition stage data of this research were consistent with results of studies of Sadeghi *et al* (2009), Wolf *et al* (2005), Hansen *et al* (2011) and Kim *et al* (2012); however, the results of acquisition stage, which is based on lack of difference between self-regulated and instructor-regulated feedbacks, are not consistent with the results of studies of Janelle *et al* (2001), Chiviawosky & Wulf (2005), Chiviawosky *et al* (2008), Kolovelonis *et al* (2010), Fairbrother *et al* (2012), Kolovelonis *et al* (2012) and Adam *et al* (2012), because the results of acquisition stage in this research emphasizes on superiority of self-regulated feedback over instructor-regulated feedback. It seems that this lack of consistence is relative to higher number of trials in acquisition stage in this research, therefore, it can be said that clearer progresses in performance of self-regulated group are seen in last trials. In retention and transfer stages, the results of this research showed that there was a difference between effect of self-regulated and instructor-regulated feedbacks on two stages of retention and transfer of basketball's lay-up shot skill. That is, performance of self-regulated group in two stages of retention and transfer of basketball's lay-up shot skill was better than that of instructor-regulated group.

The results from retention and transfer stages data in this research were consistent with results of researches of Janelle *et al* (2001), Chiviawosky and Wulf *et al* (2002), Chiviawosky and Wulf *et al* (2005), Chiviawosky *et al* (2008), Kolovelonis *et al* (2010), Fairbrothers *et al* (2012), Kolovelonis *et al* (2012), Kim *et al* (2012) and Adam *et al* (2012); while the results of this research are inconsistent with the results of the research of Sadeghi *et al* (2009). Their research focused on instructor-regulated exercise condition and considered such condition to be better in retention stage. Such inconsistency may be due to the fact that in study of Sadeghi *et al* (2009), mean received feedback in instructor-regulated group was 100%, which caused the self-regulated group not to show the better performance than instructor-regulated group, therefore, mean received feedback of instructor-regulated group in their research was higher than that of this research, because in the present research, instructor-regulated group received feedback after some of their trials.

Since the first researches which tested the effect of self-regulated feedback on motor learning which was conducted by Janelle *et al* (1997-95), subjects mean self-regulated group show a more effective learning of performance form compared with their counterparts in control group. In retention test, mean score for performance form in self-regulated group were 50% higher than those of control group, besides, the precession of the sight increased. Therefore, although succession and timing of feedback was the same in both conditions, it was self-regulated group that showed the better performance. These results and findings show the advantages of self-regulated feedback. Given this, a number of studies have shown that if the learner have control over at least some of exercise conditions, effectiveness of learning of motor skills will significantly increase; in other words, exercise protocols in which at least some of self-regulated levels are left to learner lead to a more effective learning compared with predetermined exercise protocols, Janelle *et al* (2001), Chiviawosky and Wulf (2002), Chiviawosky and Wulf (2005), Wulf *et al* (2005), Chiviawosky *et al* (2008), Kolovelonis *et al* (2012), Kim *et al* (2012) and Adam *et al*, (2012). The results of researches which studies the effect of self-regulation exercise on learning of motor skills suggest that allowing

learners to have control over, receiving feedback, use of bodily aid and provision of movement exhibition compared with external control of these factors, will improve learning of learners [20]. Although it seems that self-regulation is a powerful phenomenon in motor learning, factors which lead to this effect are ambiguous. Most of the explanations related to it are consistent with cognitive learning literature [21]. It has been suggested regarding cognitive processes that self-regulation result it increased learning because it involves learner in learning process effectively, leading to deeper processing of data. From motivational perspective, it is suggested that self-regulation may result in increased self-efficacy and target choosing [3,22]. It is probable that these cognitive and motivation processes are involved in superiority of self-regulated learning compared with learning without self-regulation, in which case if cognitive and motivation processes function independently, self-regulated learners must show a better performance during an exercise compared with the other group. In studies related to self-regulation, it has been suggested that advantages of self-regulation come with delay. For example, in retention and transfer test, by no significance difference is seen during exercise, it seems that there is a negative relation between cognitive and motivational processes. During the exercise, self-regulated group has more motivational advantages. They are autonomous with regard to target choosing, they determine the level of difficulty of exercise by themselves, they feel more independence and self-efficacy and for this reason, they have higher internal motivation and make higher attempt in learning. However, from cognitive perspective, self-regulation means putting higher pressure on learner. They decide about the manner in which they learn based on their knowledge of task and their capabilities, decide in which exercise and task they must choose, then and how much they should change their task and above these, self-regulated must measure utility of their activities at different times and correct them if required, in which case the individual must divide the focus of his/her attention between learning and self-regulation processes [17]. Therefore, the learner must adopt many decisions.

Findings of this research in retention and transfer tests, which suggest superiority of self-regulated feedback group, showed that condition of exercise with self-regulated feedback is probable to be more compatible with needs of subjects, in such a manner that learner requests for feedback when he/she feels unconfident about his/her performance and seeks to return to the desire condition by receiving feedback or when he/she wants to prove that he/she has performed his/her move correctly.

Wulf (2005), states that self-regulation exercise is effective because self-regulated learner tries different motor approaches compared with others. Chiviawosky and Wulf (2002,2005), stated that self-regulated asks for feedback when they feel more confident about their move, in other words, they receive feedback according to a specified plan and do not ask for feedback randomly, they also stated that self-regulated conditions may be more consistent with relative requirements of learners, Chiviawosky and Wulf (2005), showed that motivation may be one of the effective factors of self-regulation but it cannot be the essential factor. In other words, when the subjects beside about whether or not asked for feedback after their trials, they have a better performance and it seems that they can estimate the performance and decide about whether or not receive feedback accordingly [20]. They concluded that advantages of self-regulation, due to involvement of learner in learning process along with higher motivation of learner can lead to deeper processing of information and ultimately better learning. Kolovelonis (2010), stated that learners whose make progress in their self-controlling level continuously increased during competition showed a better development in their skills performance which development indicates development of cognitive-social models. Another result of the research by Kolovelonis (2012), was that performance subjects who receive self-regulated feedback and observed different exhibitions at different levels of competition was more developed compared with subjects to whom self-regulation was not applied. In line with these results in research by Kim (2012), self-controlled subject showed more precession and addictiveness in the course of retention and transfer compared with instructor-regulated subjects. Finally, subjects who had control on timing of feedback had higher precession and their exercises had higher consistency.

Another cause of better performance of self-regulated group is the higher feedback they receive in the first trials which in fact stress is on the role of feedback information, while in instructor-regulated group the subjects are not aware of feedback time, therefore, their performance is interrupted, but the group which receives feedback based on its requirements improves in terms of succession of exercise and by progressing in the blocks and so gain better results.

## CONCLUSION

Therefore, most researches recommend self-regulated method for improvement and facilitation of motor learning and training complex motor skills in different exercise situations. It seems that self-regulation and instructor-regulation conditions have different effects on exercise and learning performance in three stages of acquisition, retention and transfer so that self-regulation conditions probably involves the individual in ongoing assessments of performance and decision making processes related to feedback, which may cause the exercise to become more

difficult and temporarily weaken the performance. Notwithstanding, these additional data processing activities may be what makes self-regulation conditions superior over long-term considering difference between scores of learners in self-regulated and instructor-regulated groups in retention and transfer stages; in other words, it seems that subjects in self-controlled groups are well excited in the course of exercise to participate in learning process actively and to increase their knowledge of performance and increase their dependence on external feedback on that basis and as a result, show a successful performance in the stage of retention and transfer test.

Briefly, it can be concluded that self-regulated group is explicitly better than instructor-regulated group and benefits of self-regulation are extendable to complex motor skills in field conditions.

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