
Research article

EFFECTS OF AUGMENTED FEEDBACK ON SQUAT TECHNIQUE AMONG ELEVEN YEARS OLD CHILDREN

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Abstract

Journal of Sports Science and Physical Education 5(1): 1-8, 2016 - The purpose of this study was to compare the acquisition of performing the squat technique using visual and verbal feedback among eleven years old children. Thirty standard 5 students from a semi urban primary school were recruited for this study. Each participant performed the squat without any provision of feedback in the pre-test. Their performance was assessed using the Motion Competency Screen (MCS) scale. The pre-test scores were used to divide the participants randomly into three groups (i.e., visual-, verbal-feedback and control). During the acquisition phase (two weeks), the visual group (video recordings of their performance) received feedback about the correct squat technique by a qualified trainer while the verbal feedback group received verbal instructions and feedback from the same instructor on their performance. The control group did not participate in any trials during acquisition phase. All participants were tested again in the post- and retention test a week after the post-test. A 3 group x 3 tests mixed between-within ANOVA with repeated measures on the second factor was used to measure the between and within group mean differences. There was no significant different between groups for the pre-test. However, both the visual and the verbal feedback groups were significantly better than the control group in the post test. However, in the retention test, the verbal group significantly outperformed the visual group. Again both groups were significantly better than the control group. In conclusion, both visual and verbal feedbacks were effective in learning a motor skill. Interestingly, verbal feedback showed to be more effective for long term retention (learning).

Keywords: squat, verbal feedback, visual feedback, Motion Competency Screen (MCS), skill acquisition

Introduction

Squat is an effective exercise to practice as it can improve muscle strength especially on the lower limb (Chandler & Stone, 1991). However, the exercise is not easy to learn as it involves complex movements in which the individual needs to control his / her lower limbs especially the knee and lower back. The knee needs to be controlled so those during the descent phase, the knee must not excessively exceed the toe to prevent high compressive force to the knee (Baechle & Earle, 2004; Barnes & Cinea, 2007). The lower back needs to be maintained in normal posture to prevent the spine from becoming misaligned (Baechle & Earle, 2008). If the movement was performed correctly, squat will benefit the performer in terms of strength improvement especially to the lower body part. Despite the benefits that squat can give to the performer, squat is still not popular among school children. As school children are not familiar with the squat movement, it is good to introduce bodyweight squat as it is assumed there will be errors while performing the movement.

Although squat is a good exercise to be introduced to the primary school students because the squat resembles many movements within sports (Escamilla & Krzyewski, 2001), there is lack of research being conducted on determining the proper way to teach the correct squat technique. In the process of learning new skills, the organization of practice and the use of feedback are essential factors for acquiring new motor skills. Feedback is information about the action and its environment for a comparison between the real state and that one determined by the action system, allowing the correction of movements (Pusseldi & Ribeiro, 2004).

Augmented feedback plays an important role when learning or improving a motor skill especially among young people. Previous related studies have examined whether video or audio feedback were more effective for learning. For example, previous research that compared videotape and verbal feedback to examine the motivational effect on novice swimmers learning breaststroke (Ferracioli, Ferracioli & Castro, 2012). They concluded that the video and verbal groups exhibited better performance than the control group, the efficiency of the use of one type of feedback on the use of another was statistically proven because all group recorded significant improvement one phase to another.

Davis and Hendrick (2009) found that some learners may be less receptive to video feedback than others, providing them the choice of video or verbal feedback may maximize comfort without hindering learning or performance. In their study, they also said that video and verbal feedback were equally effective in learning proper squat form among college students. Bortoli, Bertollo, Messina, Chiariotti and Robazza (2010) found that verbal feedback given to volleyball athletes by coach improves their performance. The corrective feedback provided to single individuals after performance most likely reflected the coaches' intentions to direct the attention of youngsters toward the correct comprehension and execution of volleyball tasks. Winchester, Porter and McBride (2009) suggest that coaches and practitioners should use visual and verbal feedback to track bar paths with athletes learning to use the power snatch for training. In their study, augmented feedback improved power snatch better than without any feedback.

Previous study using a Glidecoach, a user-friendly software used to provide immediate feedback on glide performance to the swimmers on their aspects of swimming performance. The feedback via GlideCoach includes information about postures, initial

velocity, glide factor, and average velocity, with comparisons of those values for previous attempts, as well as displays of velocity–time graphs and video replay of performances (Naemi & Sanders, 2008). The study by Thow, Naemi and Sanders (2011) compared the effect of feedback on glide performance from GlideCoach with video and verbal feedback. The study showed strong evidence that GlideCoach and verbal feedback can improve glide performance. There was also evidence in that study that the skills attained with feedback using the software and verbal advice are retained after an absence of diving trials for 4 weeks than the video feedback than the Glidecoach with video feedback.

Herbert and Landin (1994) examined the effect of learning model and augmented feedback on tennis skill acquisition found that those who receives verbal feedback would have superior movement pattern and outcomes during both acquisition and retention than control subject. This study also found that observing learning model and verbal feedback give greater result on skill acquisition. Study by Pérez, Llana, Brizuela and Encarnación (2009) developed a system that was able to provide feedback on the swimmers' performance during training session, and then, to analyse its feedback effect on aerobics swimming speeds comparing it with the coach feedback and without feedback found that verbal feedback from the coach improved swimming speed better than the new system that they develop to increase swimmer performance.

Ericksson, Halvorsen and Gullstrand (2011) examined the correlation between mechanical factors of running and running economy using different feedback. The researcher found that the runners can perceive clearly from the feedback provided, is a reduced mechanical power. Furthermore, the auditory feedback appeared to work somewhat better than the visual feedback.

Study on the benefits of supplementing verbal feedback with video feedback on weight lifting technique by Romack and Valantine (2005) showed that video feedback enhanced the speed at which an athlete acquires a skill, compared with other teaching techniques such as live demonstrations or observation of the performer followed by verbal feedback. In that study it is important to provide encouragement upon initiation of video feedback for the learner. Initial use of video feedback may increase anxiety because of the fact that self-images are inherently anxiety-invoking (Danet, 1968). Provide encouragement upon initiation of video feedback for the learner. Educate the athlete on the anxiety invoking reactions that may occur and remind the athlete that feelings such as embarrassment are not uncommon.

Sadowski, Mastalerz, Niznikowski, Wisniowski, Biegajlo and Kulik (2011) in their study found that at early stages of learning, too much verbal information is not the basis for acquiring complex movement tasks and most often it hinders the process of learning. The results of the study of the efficiency of video feedback for learning the golf swing by Guadagnoli, Holcomb and Davis (2002), suggested that instruction (verbal or video) has the potential to disrupt a golfer's performance immediately. This immediate disruption is probably the result of changes in the swing mechanics and the cognitive effort associated with these changes. They demonstrated that video instruction and, to a lesser extent, verbal instruction had an initially negative impact on golf performance, but a long-term positive impact on distance and consistency of the golf shots. As suggested by Guadagnoli et al.

(2001), video knowledge of results is not only better than no knowledge of results, but it may provide more appropriate information than verbal knowledge of results.

Study on the effects of combining video modeling by experts with video feedback by Boyer, Miltenberger, Batsche and Fogeil (2009) indicate that exposure to the intervention of video feedback improved skill performance more quickly than regular practice and coaching alone. These results suggest that adding video modelling by experts with video feedback to typical coaching and practice techniques could reduce the number of practice sessions required to improve a difficult physical skill.

All the research discussed above reported conflicting findings about augmented feedback and it is not clear which type of feedback is better to be use in teaching the correct technique to do squat especially among children, whether video or verbal feedback. The purpose of this study was to compare motor skill acquisition using video and verbal feedback. We hypothesized that there is no significant different of effects of video and verbal feedback and without feedback on squat technique among eleven years old students.

Methodology

Participants

Thirty standard 5 students at a semi urban primary school were randomly recruited in this study. Informed consent was given to their parents and all the risks of this study was explained to their parents.

Procedure

This is an experimental study with pre and post-test design ought to determine and compare the effects of video and verbal feedback on squat technique. Thirty students were randomly divided into three groups: The video feedback group (n=10), which received videotape feedback that contained the instruction of squat exercise technique in video; whereas the verbal feedback group (n=10), who received verbal feedback that contains the instruction of squat exercise technique verbally; and the control group (n=10), did not receive any feedback during acquisition phases.

Videotape feedback

Video feedback contained the visual images instructions of squat technique in video. All squat movements by a qualified trainer was recorded using video recorder. Participants performed squat following the videotape playback.

Verbal feedback

Verbal feedback contains the verbal instructions of squat technique by researcher or instructor. Participants performed squat following the verbal instruction by researcher or instructor (refer to Table 1).

Procedures

All data was collected individually. In this study, each participant was assessed on his squat technique using Motion Competency Screen (MCS) developed by Kritz (2012). In MCS the

score was given by the researcher according to the screening criteria that are head, shoulders, elbows, lumbar, hips, knees, ankle and feet. For each screening criterion, the participants were given the score 1 if they fulfil the criteria. All scores were summed up to be their final score on squat technique.

In the first week, the participants underwent pre-test before any intervention. Each participant doing squat without any feedback in front of the researcher. The researcher gave the score of their squat technique using MCS. Their pre-test scores were used to divide the participants randomly into three groups.

After pre-test, the participants were going to acquisition phase in two weeks, which consisted of five days of acquisition in which participants performed five trials of each exercise. Video group and verbal group received feedback after each exercise trial on the first day of acquisition. In the other four days, they received feedback only after the first and fourth trial of each exercise in order to avoid dependence of this information (Magill, 2007). In this phase, participants in video group received video feedback about correct squat technique by a qualified trainer. The video was showed on the screen by projector. While participants in verbal group received verbal feedback about squat technique based on criteria in MCS as show in table 1.

Table 1. Verbal feedback that given to verbal group

<p>HEAD - Centered</p> <p>SHOULDERS - Held down away from the ears. Elbows held behind the ears throughout the squat.</p> <p>LUMBAR - Neutral throughout the squat</p> <p>HIPS - Movement starts here, aligned and extension is obvious</p> <p>KNEES - Stable, aligned with the hips and feet</p> <p>ANKLES / FEET - Aligned with the knees and hips. In contact with the ground especially the heels at the bottom of the squat and feet appear stable</p> <p>DEPTH - Thighs parallel with the ground</p> <p>BALANCE - Maintained</p>
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While control group was not involved with any trials during acquisition phase. After the end of the fifth day of acquisition, all participants performed one trial of each exercise without receiving feedback for the post-test. A week after the post-test, retention test was conducted which participants performed one trial of each exercise without receiving feedback. This test indicated the consistency of the learned motor pattern after the absence of practice showing the method's efficiency (Magill,2007).

Data Analyses

All data was analysed using 'Statistical Package for Science Social' (SPSS) version 20.0. All the findings were recorded and included in the table. ANOVA was used for intra group analysis, type of augmented feedback and mean score.

Results

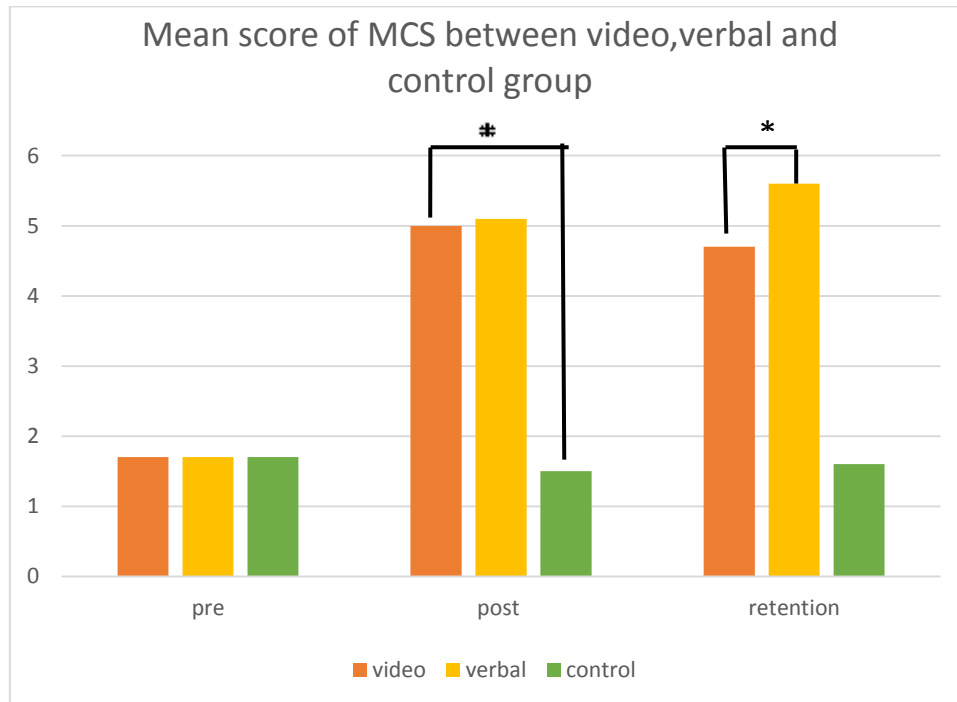


Figure 1. Mean score of MCS between the video, verbal feedback and control group
* significant difference at $p=.05$

There was main effect for test $F(2,54) = 81.850, p = 0.001$. There was main effect for group $F(2,27) = 84.640, p = 0.001$. There was an interaction between test and group $F(4,54) = 24.302, p = 0.001$. There was no significant difference between group for pre-test. However, for post-test, video group ($M=5.0; SD=0.7$) and verbal group ($M=5.1; SD=1.0$) was better than control group ($M=1.5; SD=0.5$). In the retention test, verbal group ($M=5.6; SD=0.5$) was better than video group ($M=4.5; SD=0.1$), both groups are better compared to control group ($M=1.0; SD=0.7$). Based on the analysis, it clearly showed that verbal group was much better than other groups in retention test.

Discussion

The purpose of this study was to compare the effectiveness of motor skill acquisition using video and verbal feedback. Based on the result, the verbal and video feedback were more effective in teaching the squat technique than the control group who performed without any feedback. However, during retention test, participants that received verbal feedback has better scores than participants that received video feedback. This showed that, verbal feedback can improve squat technique learning more than the video feedback. This was supported by Bortoli et al, (2010) study which found that verbal feedback given to the volleyball players by the coach improves their performance.

The corrective feedback provided to the individuals after their performance most likely reflected the coaches' intentions to direct the attention of youngsters toward the correct comprehension and execution of volleyball tasks. Davis and Hendrick (2009) found that some learners may be less receptive to video feedback than others, providing them the choice

of video or verbal feedback may maximize comfort without hindering learning or performance.

As a conclusion, this study shows that the video and verbal feedback can be used in squat learning technique but verbal feedback give better result in retention test. Based on the findings of the present study, future aspects of research should be focusing, other skills to be teach such as lunges, push up, sit up and etc. Other than that, different types of video can be used to show to the participants during video feedback. The researcher can record the video of participants during trial and then show it to them for video feedback. Scheduling of feedbacks also can influence the results of the study. In this study, feedback was given after the trials. In future, the feedbacks can be given before the trials or during the trials to see different results in skills acquisition.

Future studies also can use software or high technologies gadget to give feedback to the participants. As example from previous research (Thow et al, 2011) that used Glidecoach, a user-friendly software that used to provide immediate feedback on glide performance for use by coaches and athletes during aspects of swimming performance. The feedback via GlideCoach includes information about postures, initial velocity, glide factor, and average velocity, with comparisons of those values for previous attempts, as well as displays of velocity–time graphs and video replay of performances (Naemi & Sanders, 2008). Using software or high technologies gadget to give feedback to the participants can give different result in motor skill acquisition.

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