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THE EFFECTS OF LIVE AND VIDEO DEMONSTRATION ON THE EARLY ACQUISITION OF A NEW MOTOR TASK

Ivan Vrbik[1], Tomislav Krističević[2], Goran Sporiš[2] and Dejan Madić[3]
[1]Industrial school Sisak, Sisak, Croatia
[2]Faculty of Kinesiology, University of Zagreb, Croatia
[3]Faculty of Sport and physical education, University of Novi Sad, Serbia

Abstract
Demonstration is a widely used method in sports teaching and coaching, as well in Physical education classes. The most commonly used types of demonstration live demonstration and video demonstration. However, a direct comparison between these two types of model has rarely been undertaken in a motor context. Therefore, the aim of this reseasrch is to specify and compare the effects of the two different metric protocol, former standard and the new video demonstration, on the estimation of the test results in the primary school.The participants involved the third and the fourth year students from four elementary schools in Petrinje and Sisak which territorialy belong to urban area of the Sisak- Moslavic county. The total number of students on whom this research has taken place was 327, of which 186 were boys and 141 were girls at the age of 10,5. The students were divided into two subsamples considering the used treatment,both standard and video demonstration protocol. The sample of variables in this research consists of four tests for evauating motor abilities: Shuttle run, Back-save sit and reach for the right and left leg, Push-ups and Curl up. The use of video demonstration protocol for task performance has shown a significant effect in the tests Shuttle run and Curl up, while significant effects were not gained in both both flexibility tests (Back-save sit and reach for the right and left leg) and strength tests (push-ups) due to the protocol. The results indicated that video demonstration seems more effective than the live one for the early acquisition of a completely new motor skills.

Key words: protocol, video demonstration, students, motoric tests

Introduction

The rise of awareness about the effectivness of learning methods brings up the question of validity of previous methods and innovative techniques which are implemented into the purpose to improve the effectivness of the new motoric tasks. Children's familiarity with the metric protocol, then the way the information was given during the introduction and demonstration are exceptionally valuable for the final outcome of the tests for the evauation of the motoric status (Hayes, Hodges, Scott, Horn, & Williams, 2007; Sullivan, Kantak, & Burtner, 2008), and at the same time influence the improvement of the study of a particular movement pattern (Al-Abodd, Davids, & Bennett, 2001; Horn, Williams, Scott, & Hodges, 2005; Laguna, 2008). The study, the implementation of a new motoric knowledge often asks for coordination and control of not only the limb movement, but also the whole body while performing with limitations imposed on by space and time with the final goal to master the given task.The various forms of information could be given to the examinee as a sort of help in finding the solution (Magill, 1993; Magill & Schoenfelder-Zohdi, 1996). In each situation where certain motoric knowledge needs to be adopted, learned, the performer is given the instructions about the correct pattern movement and technique. Those instructions frequently refer to the coordination of the examinee's body movement, thereby including the order, the form and time sequence of certain limb movement (Wulf, 2007). Feedback can influence the examinee's attention, and thus ultimately a better adoption during the task performance. Contrary to instructions, feedback refers to the current individual performance , more specifically to what the teacher, instructor or a coach consider a mistake or a deficiency during the movement performance (Wulf, 2007). A significant level of attention is needed in order to accomplish the goal of teaching an individual a new task, especially about sports skills (Hodges, Williams, Hayes, & Breslin, 2007).

In the domain of education, during Physical Education classes, while passing on information, the description and live demonstration are usually applied for introducing the task. Moreover, it is used for testing protocols in order to evaluate the level of students' motoric abilities (Findak, Metikoš, Mraković, & Neljak, 1996; Metikoš, Mraković, Prot, & Findak, 1989; Neljak, 2011; Novak, 2010; Prskalo, 2011). The frequent assumption is that demonstration is more useful than both verbalization and attempt- mistake method during the skill adoption (Horn, Williams, & Scott, 2002). Because of that, the use of demonstration during the process of instruction and testing protocol in both sports and all the other forms of physical exercise has spread. The ability of demonstration is considered the most effective factor in the process of study, and consequently both teachers and coaches should implement that method for a short-term transfer of information to a student (Maleki, Nia, Zarghami, & Neisi, 2010). The implementation of demonstration as a method skills aquisition is of an extreme importance, due to the fact that is based on both capacity and nervous system capability, to get an important noticable information from the presentation of a model which can be converted into a exiting motoric command (Buchanan & Dean, 2010).

Nowadays, alongside a standard protocol with live demonstration it has begun with the implementation of various forms of protocol which could significantly improve the adoption of motoric skills. It became clear that people learn by observing others (Hodges et al., 2007), and in order to describe the process of observational learning a few concepts and terms proved to be efficient.

However, one of the ways of information transfer, that was introduct is a video modelling of expert performance. A video modeling of the expert performance or a direct demonstration is the most common form of giving instructions while learning a specific motoric task (Dussoulin & Rehbein, 2011). Just as Magill (1993), then Magill & Schoenfelder-Zohdi (1996) have confirmed in their research that examinees could learn the skill by observing the expert without gaining any kind of expanded feedback. At the same time Ram, Riggs, Skaling, Landers & M_cCullagh (2007) define *modeling* as an intervention in which external stimulus is used, like alive demonstration or a video demonstration, during which the observer watching somebody else's performance receives the confirmation about the correct manner of the task performance. According to Boyer, Miltenberger, Batsche and Fogel (2009) video modeling involves a video sequence of the expert performance presentation of a certain task which will be later shown to athletes, students. Modeling as a protocol which gives information about the essence of movement or a task should be performed habitually as an information „ what to do" and principally it refers to an attempt to perform (Zetou, Tzetzis, Vernadakis, & Kioumourtzoglou, 2002). Recurring video information enables a complete recurrent information about the performance and it uses a model as a presentation of a correct performance which supplements the standard manner of adoption and improvement by adding a visual component to a verbal returning information (Kelley, 2014). During the observation, the students selectively gain information about space and time features of motoric skills and tasks.

The effects of video modeling, in learning certain motoric skills were gained by Atienza et al., (1998) in tennis, Guadagnoli et al., (2002) in golf, and Zetou et al., (2002) in volleyball, Hodges et al., (2003), as well as Horn et al., (2005), and Laguna, (2008) in adopting a new coordination task, Boyer et al., (2009) in gymnastics, Aiken et al., (2012) in basketball free throws, and Vrbik (2015) in the implementation of the motor tests. Contrary to these studies which have proved the positive effects of the video demonstration, the differences between the protocols were not gained in the researches Al-Abood et al., (2001), Haguenauer et al., (2005), Horn et al., (2002), Jennings et al., (2013), Magill & Schoenfelder-Zohdi, (1996).

Based on the inspection of previous studies and their results rises a question which protocol is the most effective in gaining the best results. In keeping with the raised question there has been a hypothesis that there exists a statistically significant difference between the results gained by a protocol which include the video procedures for estimating the motoric abilities and those gained with a standard protocol of measuring motoric abilities which don't include a video demonstration of motoric tasks. Then based on that hypothesis the aim of this research was to establish the results of two different testing protocols, the previous standard and the new one with a video presentation, in order to learn a new motoric task.

Methods

The participants for this research were students in the third and fourth grade from four elementary schools that belong to the urban area in the towns of Petrinja and Sisak. The total number of students that participated in the research was 327, out of which 186 boys and 141 girls, aged 10,5 that are 145 cm tall on average and have the average weight of 38,7 kg. The students were divided in two subsamples, based on the protocol applied: Standard Protocol (183; 110 males and 73 females) and Video Demonstration Protocol (144; 76 male and 68 female).

All the participants in this research attend regular classes of physical education, and did not previously have experience with most of the given motor tasks, and they were completely healthy during the tests. The research is approved by the Scientific and Ethical Committee of the Faculty of Kinesiology, the University of Zagreb, the Senate of Zagreb

University, while the head-masters of the schools mentioned above allowed the participation of their schools before the beginning of the research. After that, parents of each child signed the written agreement for the participation in the research and they were informed about the object and the aim of the research.

The sample of variables in this research included 2 anthropometric measures (body height and weight) and 4 tests for motor skill assessment (Shuttle-run, Partial Curl-up, 90° Push-up, Back-saver sit and reach).

Shuttle-run: a participant stands outside the start line in a high starting position, head turned towards the movement direction. On the sign "Ready! Steady! Go!", the student runs to get the sponge, pick it up, runs back to the start-finish line, puts the sponge behind the line, runs back to get the second sponge, takes it and runs back behind the start finish line. The task is done when the participant puts the second sponge behind the start-finish line (Malina, Bouchard & Bar-Or, 2004; Welk, & Meredith, 2010; Novak, 2010; Vrbik, 2015).

Curl-up: a student is lying on the mat with his/her knees bent in 140°, with the hands extended along the body and palms facing the mat. Under the feet, the measuring tape is put in the line with the top of the middle finger, and a piece of paper is put under his/her head. The student starts doing the task on the sign, lifting the head and shoulders while sliding with the hands on the measuring tape and putting the head back on the paper every time. The test is finished when 75 lift of the upper body is done, when the student repeats a mistake for the second time while doing the activity or is not able to continue the performance of the motor activity (Welk, & Meredith, 2010; Novak, 2010; Vrbik, 2015).

90°Push-ups: a student is in the position of back press with the hand in shoulder width or a bit wider, legs straight and spread a little, feet on the mat, back straight. The student goes down with the hands towards the mat until the upper arm is parallel with the floor, and then lifts up back to the starting position. The task is done when the student is not able continue the task or the second correction is done during the performance (Welk & Meredith, 2010; Vrbik, 2015).

Back-saver sit and reach: a student sits in front of the measuring device, one leg completely extended, while the other is bent in knee with the foot on the mat. The arms are extended to the front above the measuring scale with the palms put together, both facing the mat. With both palms the student bends forwards over the measuring tape and holds the last position for one second (Welk & Meredith, 2010; Vrbik, 2015).

Experimental procedure

The research was conducted at the regular classes of physical education in the school year 2013/2014, during May and the beginning of June. In the same period of time, lasting two weeks, the experiment was done in both groups in two treatments. The first treatment included the initial testing of all the students in the tasks. The second treatment consisted of testing after the treatment in each task, using the method of random choice and applying different metric protocols. Before doing the experiment, both groups of participants were prepared by doing a 5-minute warm up that included joint rotations and basic games appropriate for the age of the students.

Participants observed either a live or a video model executing the task during the two weeks. Groups were determined randomly, with each class using a particular protocol. The standard protocol includes a description of motor task and a demonstration by the PE teachers. Motor tasks are new for all subjects and all subjects were given the same instructions. All subjects were instructed that their task is to take advantage of the demonstration to overcome and improve the performance of each task. The protocol with video demonstration along with a description and demonstration of motor task by the teachers, includes a video display of performance task (Horn et al., 2005). The tendency in this protocol is the introduction of video with methodological guidance focusing on the most common mistakes. Video clips were recorded on camera Sony HDR-XR155E. Video demonstration of the task was shown using a laptop (Toshiba Satellite L300, Neuss, Germany) and via video projector (Acer P1165, DLP Projector, China) on screen size 1,8mx2,0m (Sopar, Top Projection, Italy) which was set 5 meters of students, in order to maintain realistic model viewing angle of 18 ° (Horn et al., 2002). Duration of observation of each task consisted of methodically guided introduction to the task and possible errors, and after that watching a video five times with performance of a particular task by models (Horn et al., 2007).

SPSS (version 10.0; SPSS Inc., Chicago, IL) was used for the statistical analysis. Means and standard deviations of all variables were calculated. The normality of the distribution was tested using Kolmogorov-Smirnov test and it showed an appropriate normality of the distributions for all the studied variables. Training effects were analyzed using a two-way analysis of variance (ANOVA) (2 x 2) with repeated measures. The effect sizes of each variable were tested using Cohen's d and partial eta (η) squared between groups (Pallant, 2009). The level of significance was set at $p \leq 0.05$ and all data are reported as means ± SD.

Results

The Kolmogorov-Smirnov tests showed that data were normally distributed. Table 1 shows the descriptive parameters of the results for each motor test, as well as the results of analysis of variance for each test. Statistically significant protocol effect was gained in the tests Shuttle run and Curl up, and all the gained difference is in favour of video presentation protocol. There were no significant differences in the effect of both flexibility tests (Back-save sit and reach for the right and left leg) and strength tests (push-ups) due to the protocol.

Table 1. Difference between two testing protocols measured by Anova

	Standard protocol		Video demonstration protocol		Anova		
TEST	N	mean±SD	N	mean±SD	F	p	Partial eta squared
SR I	183	12.45±1.1	144	13.26±1.34	26.593	*0.000*	0.076
SR F	183	12.30±1.15	144	12.86±1.25			
BSRR I	183	23.25±5.18	144	22.91±5.68	0.124	0.725	0.000
BSRR F	183	22.24±5.24	144	22.42±5.56			
BSRL I	183	23.03±5.28	144	22.38±6.122	0.413	0.521	0.001
BSRL F	183	21.65±5.35	144	21.83±5.99			
Push-ups I	183	8.61±8.04	144	6.69±6.76	0.289	0.591	0.001
Push-ups F	183	8.05±6.99	144	10.13±8.86			
Curl-up I	183	16.14±10.7	144	14.68±10.28	8.380	*0.004*	0.025
Curl-up F	183	15.20±10.48	144	23.34±15.43			

SR I – Shuttle-run (initial measuring); SR F – Shuttle-run (measuring after the protocol); BSRR I – Back-save sit and reach for the right leg(initial measuring); BSRR F– Back-saver sit and reach for the right leg (measuring after the protocol); BSRL I – Back-saver sit and reach for the left leg (initial measuring); BSRL F – Back-saver sit and reach for the left leg (measuring after the protocol)

Discussion

This study was conducted to determine the effects of video demonstration protocol on motor ability level during the motor test performance. Systematic tracking of the complete development of a child, and thus gaining the integral picture of the characteristic development trend is extremely important for the further work programme directing, which is significantly influenced by the manner in which the results were gathered and gained. At the time when technology and all its versions take a primary role in all the spheres of life, when they are used as a means of work, and most of the people are familiar with them, especially children, then why wouldn't we use it with protocol application for gaining the test results in estimating the motor abilities?

Statistically significant protocol effect was gained in the tests Shuttle run and Curl up, and all the gained difference is in favour of video presentation protocol. There were no significant differences in the effect of both flexibility tests (Back-save sit and reach for the right and left leg) and strength tests (push-ups) due to the protocol. There are several factors which had influenced the gained differences between protocols. A moderate attention, as one of the leading factors, represents the reason why that kind of protocol was used. It happens that in our surroundings or within ourselves we notice only some of the things on which we are more focused than on others timely because of our own emotions , attitudes and expectations. That is called the selective perception and it comes as a consequence of attention (Brlas, 2010). The selective attention does not depend only on needs and interests, but also on the arousal features: intensity, visibility, weirdness, innovations, contrast and repetition. Cognition of the outer world starts with occurrence of feelings, then perception and ends up with mental processing, opinion, and perception and opinion are cognitive processes (Brlas, 2010). With all this, it started with the assumption about how the students would use most of the given information, then utilize it for finding the solution of the problem, in this case motoric task. Singer (2000) supports the thesis that the observation leads towards the action, and the very action influences the observation, so that the attention is focussed on situation and challenges it carries within.

In the Shuttle run test there were differences between groups at the initial measuring, and those differences were presented even after the use of the protocol. The group which was using the standard protocol had better results, but the better effect in the change of results was established in the group after the application of the video demonstration protocol. There was a significant improvement in the group which had a video demonstration protocol, which is in this case 0,4 s reduction, and according to Cohen's d ES=0.3 it is the validity which leans towards the moderate value effect. It is well known that the agility performance is influenced by speed and explosive strength. Due to that fact, it is quite possible assumption that the groups also varied in those abilities. Furthermore, as Sekulic & Spasic (2015) concluded in their study, a great speed could influence the agility performance by deepening the stopping track. Adding that aggravating factor in cognitive processing is the information about the movement direction change, and with all this in this case raising and putting down the sponge. While using the video demonstration protocol, the attention is focused on critical spots of the performance during the demonstration. Critical spots during the task performance were demonstrated more vividly with given directions, so that the processing of information was made easier for children. The information processing ability of young learners could be effectively improved getting gradually and systematically contextually involved (Saemi et al., 2012). This was clearly visible, for example, at the stopping spot, before the change of direction, and then putting down and lifting of the sponge.

The effect and the benefit of the video presentation protocol are manifested in the best manner via test Curl up. Reusable view presentation and focusing of attention on critical spots of the test performance came into the spotlight. After the application of the protocol, the group using video presentation improved the result for approximately 8 push-ups in relation to the group using standard protocol. This difference between the groups could only be explained by gradual and systematic contextualized involvement with direction of the attention, which led to the better treatment, and among other things processing of the information, which finally brought better results. Furthermore, it was very difficult for the students to separate a classical body lifting movement, which they are already familiar with, from the new task which was set in front of them. Al-Abood et al. (2001) stated considering the Curl up test, which was completely a new task, that in a standard protocol too much information was given in a short period of time, and from all this an insufficient quality information selection has occurred, which had as a consequence low results.

There was no significant difference in the upper body strength, even though there is a difference between the protocols. The results of the improvement were visible in the video demonstration protocol, however, without statistical significance. A correct performance technique makes easier the task performance, especially when it is known that a man can lift 70% of its weigh in the push-ups upper position (Baumgartner et al., 2002).

In the end, there were no significant differences between protocols in the flexibility test. Flexibility is an ability which is influenced by continuous exercise, in a short period as it was a period of research, there could not appear any significant changes. This was not a complicated test which would demand more precise directions and a complex performance data processing.

The model observation during video conference leads to the temporary movement choice and effects in the early phase of adoption (Horn and et., 2007) . Moreover, a time period during which the video presentation was shown, meaning , the time for which the examinee should have overcome the shown task, was much longer than the one for the group using the standard protocol, and demonstration is the one which transfers the information. Based on the shown demonstration , and at the group using video demonstration protocol, which lasted longer, the adoption is speeded- up, so that the movement pattern could better technically parameterized with lesser number of practical attempt (Horn et al., 2007). According to Sherwood & Rothman (2011), have concluded that the change of motor parameters in the programme, brings up the enhancement of mistakes during the performance. The difference in continuous and variable exercise performance includes the involvement of this during the motor programming process, and are based on the fact that movement outcomes are different under the parameter value change influence (force, time, amplitude, strength), while the appearance remains unchanged, that is featured such as time and order. It is a fact the visual information is much more efficient in planning future movement performance order. Learning by observing the model could not be considered a simple imitation within a specific space of motor behaviour, but a process in which the examinee observes the model behaviour and adjusts it their own performance as a result of interaction (Horn & Williams, 2004). It is an efficient method for using the simple and complex motor tasks of learning, and performance observation , if it is used with personal task performance can significantly contribute to learning skills (Wulf, Shea & Lewthwaite, 2010). Because of that, a group using video demonstration, which had a longer period of time, and which contributed to faster adoption and possibility to adjust tasks to their own abilities, under probably the same possibilities and conditions of acquaintance with a similar form of movement the former and the latter. During the task performance, taking into consideration the fact they were divided into smaller groups , during both of the protocols, after the performance presentation supported by their own kinaesthetic sense of performance, they had a possibility to observe the very performance of other examinees in their own group. From the very beginning, a group using video demonstration was in advantage because it had at disposal a longer time period for observation, which resulted in a greater number of task presentations. That additional possibility to observe while the waiting for another performance could certainly contribute to making a motor programme, and further to a better possibility to process and to correct parameters of certain tasks, which was visible outcome of the protocol.

The use of video demonstration protocol for task performance has shown a significant effect on gaining the correct result for estimating a student's motor status in tests Shuttle run and Curl up, while significant effects were not gained in both both flexibility tests (Back-save sit and reach for the right and left leg) and strength tests (push-ups) due to the protocol. The use of the video presentation is a good method for improving learning (Tripp & Rich, 2012), which was established even in this research on adopting tasks intended for estimating motor abilities.

The results indicated a significant improvement in the task execution by the end of the treatment. However, this improvement occurred only for the video-model group. Therefore, the video demonstration seems more effective than the live one for the early acquisition of a completely new motor skills. This may be due to the simplification of the visual information which may allow the observer to identify the more key elements that would guide him for the subsequent performance of the task.

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