

METHODOLOGY

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Construction and importance of video based analyses teaching in physical education by use of window live movie maker

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Abstract

Introduction: Today, Video Based Analysis (VBA) is one of the teaching methods widely used in different fields that help in effective teaching and learning process.

Objective: To construct a self made video based analysing teaching and to focus on the importance of VBA teaching method in the field of Physical Education (PE)

Method: For the purpose, a self- made video (Length = 00:02:21) was constructed. A series of set shoot skill by one athlete who represented university in basketball was recorded using high speed camera. The materials included are one digital video camera and a laptop or computer with the software Windows Live Movie Maker, which allows frame-by-frame playback of the video.

Outcomes: The outcomes of the study was that a self made video model was constructed by used of WLMM, which can be used as teaching tool, feedback tool, visual perception of the skill, creating interest to the participants. The skill was divided into three (3) phases for analysing the body and leverage movements while executing the skill which is unnoticeable by the naked eye in a fraction of seconds.

Conclusion: Using this video model (VBA) will offer varied opportunities as it allows performance to be paused, repeated, played in slow motion and can be used in all types of model-based practices like sports education. The use of VBA in teaching along with any model-based practices will help in improving the motor educability, efficiency and performance of the students.

Keywords: Video based analysis, High speed camera, Window live movie maker, Motor educability, Frame

Introduction

Today's world is a world of technology revolution, wherein the desire to capitalize the new generation's appetite for multimedia presentations are increasing (Van Laarhoven & Myers 2006). In such a scenario adopting the audio- visual method of teaching would be the most apt as teaching in Physical Education (PE) is a huge challenge (McLean & Daniel 1996) as it involves learning by doing. The classroom in actuality is a field of activity that involves myriad forms of unique teaching methodology (Singh et al. 2005, p. 149). Video Based Analysis (VBA) is one of the many teaching aids that would offer teachers, lecturers

and curriculum developers to inculcate interest (Towers 2007, Zelaznik, 1996) and attention (Ozkan, 2002) among their students. Videobased lectures can become a cost effective teaching method (Toledo University YouTube Fridays) in that they can be created once, and then saved in libraries to be used by a large number of academic educators (R.E.-S.H. El-Sayed, S.E.-H.A.E.-R. El-Sayed 2013).

Video analysis is a common tool that is used in modern sports to increase coaching performance (Dam 2012; Martin 2011) for individual and team competitions (Harvey and Gittins, 2014). The National Association for Sport and Physical Education (NASPE 2009) believes that technology can be an effective tool for supplementing instruction when used appropriately. Video instruction used in physical education is to provide students a view of their own performance or feedback as to what they have done (Silverman, 1997), or to provide instructors/coaches the proper steps to instruct others, not necessarily feedback on their own performance (Aaberg et al. 2001). Video-based coaching is an educational modality that targets intro-operative judgement, technique and teaching (Hu et al. 2012). Coaches and trainers use this method as a corrective method that will help in improving the performance of the athletes since they are only able to recall 30—50 % of key performance factors they had witnessed, even with special training in observation (Franks and Miller 1991; 9 (3), 285—297). It serves as a feedback for the players which in turn help in motivating them to perform better.

A. Lyons et al (2012), expressed greater perceived learning through the mediators of perceived usefulness of videos, class interactivity, and felt comfort in the class. The value of a video clip as a teaching tool lies in its potential to: 1. Tap simultaneously into core intelligences, 2. Engage both hemispheres of the brain, 3. Manipulate students' alpha and beta brain waves i.e. relax or make them alert (Berk, 2009). Besides, the use of Video analysis software helps in gait analysis (Borel et al. 2011), biomechanics research (Curran and Frossard 2012) and injury rehabilitation (DeLisa et al. 1998; Eastlack et al. 1991) . Hence, the purpose of this paper is to emphasize the importance of Video Based Analyses teaching and inculcate the method in the field of Physical Education and Sports.

Definition

A page devoted to the specification of some defining operation is shown in Appendix: Table 2, as the area encompassed by the term may differ from the views of many readers.

Purpose

In this paper, it explains the purpose of, instructional manual for creation of, and usage instructions for video based analysis (VBA) by used of Window Live Movie Maker (WLMM), an emerging technique of video review attempting to encourage the use of video-based analysing teaching in PE. The secondary purpose of video based analysing teaching is to present a video methodology to deliver a more informed concept in a more interactive and engaging manner to understand the minute detailing of the physical movement of the athlete.

Material

The materials included one digital video camera with a tripod stand and a computer with software (window Live Movie Maker) allowing frame-by-frame playback of the

video. Reflective marker is optional but it is very much needed to see the clear movements of the joints.

Participant

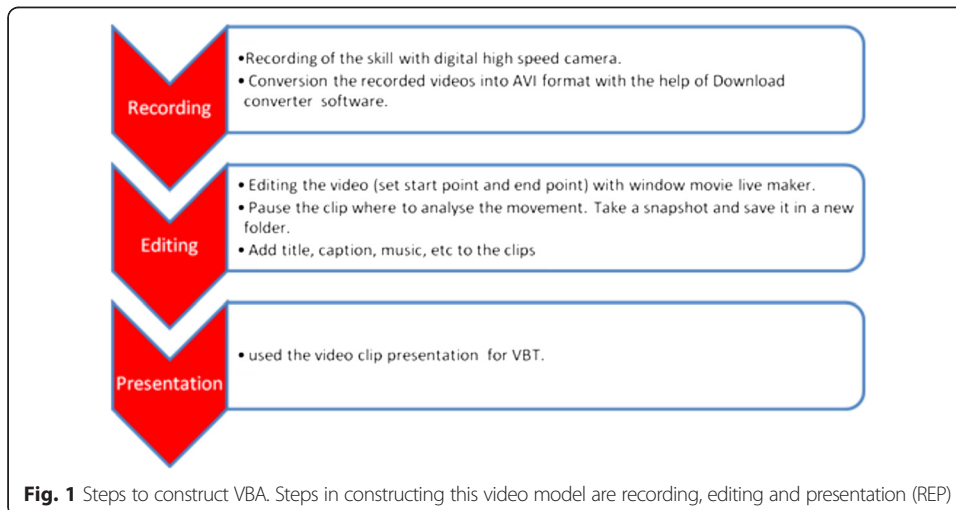
A National Basketball player who has represented University was recruited as subject for constructing a video-based analysis teaching video.

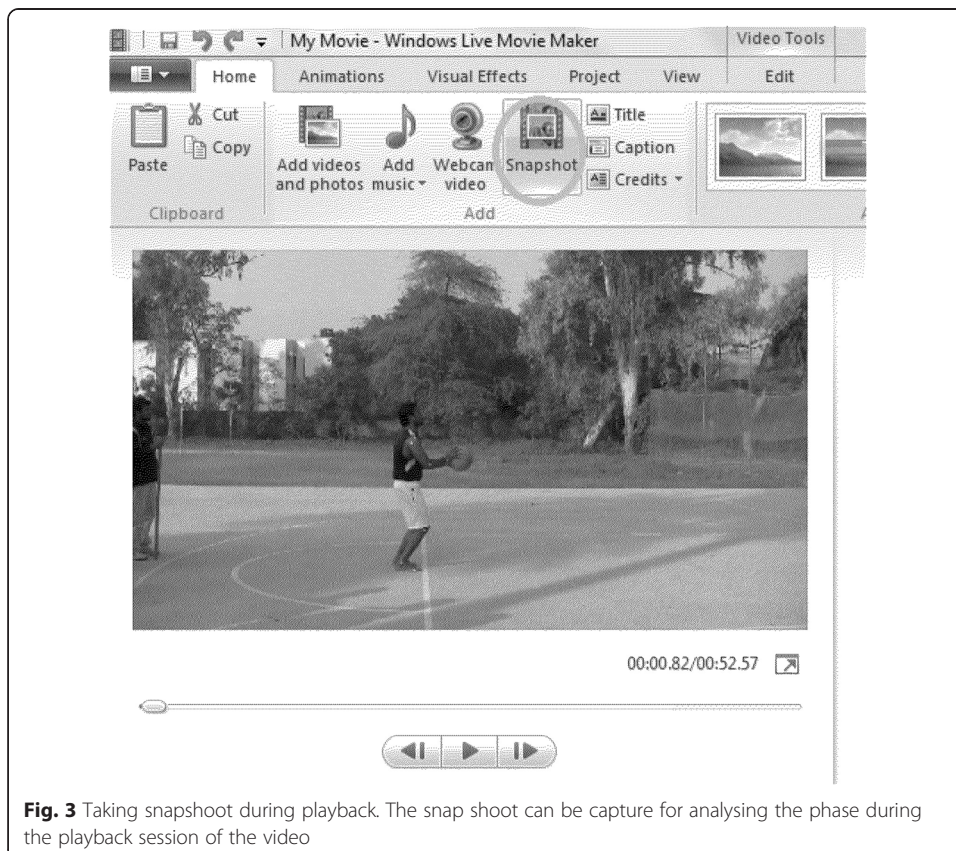
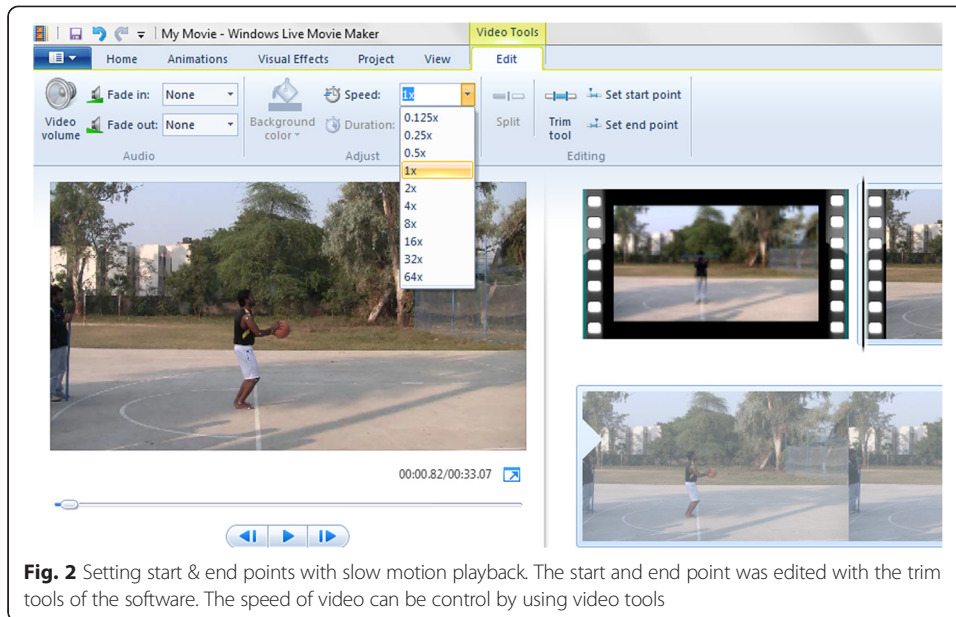
Procedure

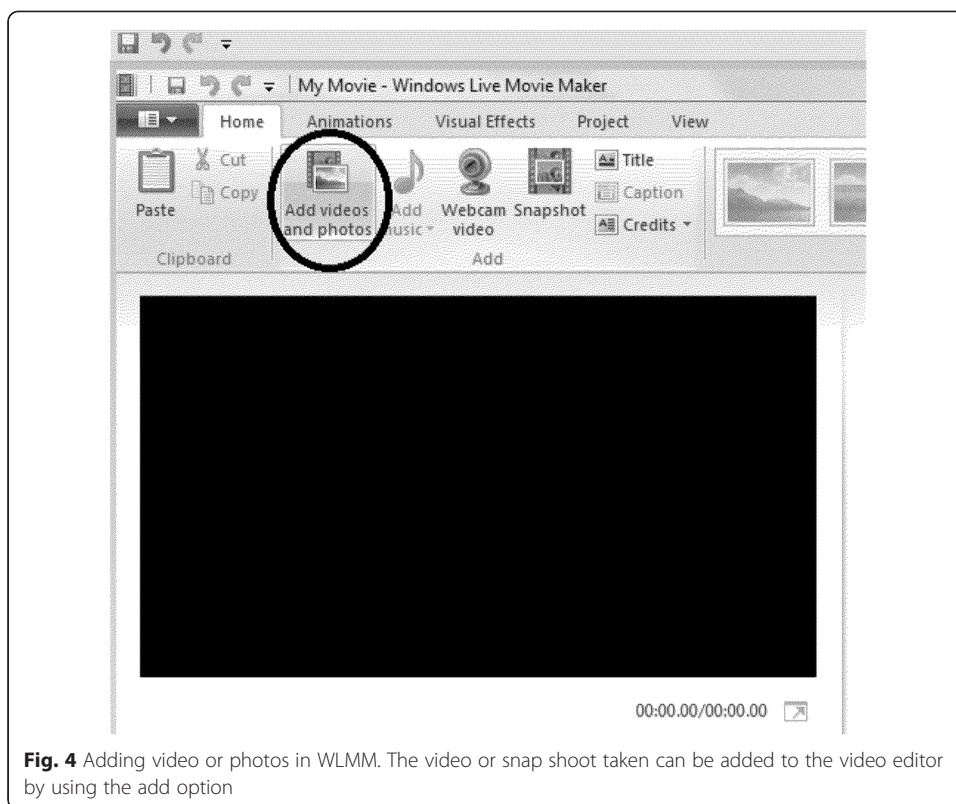
The video capturing session was conducted at the basket-ball court of the Department of Physical Education, Aligarh Muslim University. A male former college basketball player volunteered to be the subject. He signed an informed consent document for the protection of the rights of research participant. Reflected markers (25 mm) were attached on the joints of the subject to see the clear movements of the skills. The stationary camera was kept on the tripod at an approximate horizontal distance of 7.5 m from the shooting area of the court and 1.5 m above ground level. The subject started the action from a stationary position about 4.5 m away from the basket. Figure 1 shows the REP- Model followed in bringing out this video.

The first step is “Recording” of the skill. This was done with the Digital high speed camera (Cannon- Model EOS-7D) made in Japan. The video recorded was converted into AVI format using video converter (version 3.0.3) that allows synchronous audio-with-video playback.

The second step is “Editing” of the video recorded, by used of window live movie maker (WLMM). The video was played with WLMM by adding the video, start and end point was edited with the trim tools of the software (Fig. 2) to hide any unwanted part of the video clips. Speed of the video was controlled according to the need and the particular part to be analysed was paused. Snap shoot was taken during the skill execution (Fig. 3). The snap shoot picture (Ready Position, release of ball, etc) was saved in a new folder to construct a VBA teaching video. A new WLMM video editor was open, the saved snap shoot was added (Fig. 4) to construct the final video for highlighting the







progressive changes of body movements during the skill execution starting from the ready position till the release of the ball. The music, title, etc was edited using “Edit Text Tool”. Lastly, an “Auto Movie Theme” (contemporary style, cinematic style, black and white style, etc) was chosen to play the presentation.

The last step is “Presentation” of video which can be used as a teaching tool, giving feedback, visual perception of the skill, etc. The flow-chart steps to prepare the video model are shown below:

Open WLMM < Add Video clips (Uncut) < Video tools < Set Start & End Point < Snap shoot < saving in a new folder < Open new WLMM < Adding the snap pictures < Add Title, music & caption < Editing the title < Chose Auto Movie Themes < Presentation.

Outcomes

The outcomes of the study was that a self made video model was constructed by used of WLMM, which can be used as teaching tools, feedback tool, visual perception of the skill, creating interest to the participants. The progressive change of the joints starting from the ready position till the release of the ball was analysed using the video model. These fast movements are not generally noticed by the naked eye. Therefore, it is important to use such video method, as initial learning stages involve understanding global aspects of the task (Ahissar and Hochstein, 2004). The learning of motor skill (Set Shoot) initially involve perception of an object, especially visual perception, the interest in perception accompany the development of the interest in skill acquisition (Singh et al. 2005, p.148). Mayer in 1996 also supported that learning

a motor skill initially involves visual perception of the skill to be performed which inculcate interest in mental imaginary accompany the development of the interest in skill acquisition (Towers 2007).

Use of such video method in teaching may improve learning outcomes for students, even though it adds to cognitive load (Homer et al., 2008) and it create a sense of social presence (Gunawardena, 1995). Though players have different level of motor educability and different ranges of initial skill levels (Machar Reid 2009), which is the ability to learn motor skills easily and quickly (Mc. Cloy and Young 1984). Karkare (2015) found that group with higher motor educability have shown more physical skill compared to low motor educability group. Syamsuddin (2014) also studied the influence of teaching styles and motor educability on the learning outcomes of volleyball. He found that students who have a high motor educability, learning outcomes of volleyball through application of a practice style is better as compared to an inclusion style (Lecturer teaching).

Table 1 shows the basic movement of joints involved in the set shoot in basketball which will help the individual to visualize symbolic rehearsal of the skill. The technique to be learnt should be visualized in the mind without doing any muscular movements which will serve as a useful model for the athlete to analyse their progression for better future performance.

By used of this one dimensional video-based analysis, the skill of set shoot in basketball was divided into three (3) phases for easy understanding of the skill execution:

- L Phase,
- I Phase and
- Good Bye Phase

L-phase

As the outcomes of the videos, the progressive changes of body position, joints movements, etc can be depicted easily that will make to know the set shoot skill know more clearly. In the L-phase, throwing hand is in the shape of alphabet “L-shape” (Additional files 1, 2, 3 and 4).

Table 1 Phases of set shoot in Basketball. Basic movement of joints involved in the set shoot

Phases	Body Position	Joints Movements
L- Phase <ul style="list-style-type: none"> > Flexing of joints (Step 1) > Angles of Joints decreases (Step 2) > Range of Motion (Step 3) 	The throwing hand is in the shape of alphabet “L” when in ready position. Counter-action of upper and lower extremities can be seen to balance the body.	Elbow Joint of the throwing hands makes an angle of 90 degree when ready position. The elbows and knees joints start flexing which act as a lever to generate force for the action.
I-PHASE: <ul style="list-style-type: none"> > Leverage Extension (Step 4) > Back Spin (Step 5) 	The throwing hand take I- shape when extended. The fingertips are used to release the ball to make it spin backward so that the ball remains near the rim.	The Elbow’s and Knees joints which act as a lever (1 st class) start extending to give force to the ball.
GOODBYE PHASE: <ul style="list-style-type: none"> > Follow Through 	In the Good-bye phase, when you snap your wrist by waving like Good Bye.	The Elbows and knees joints axe fully extended so that the body weight is transfer to the feet. The wrist makes a follow through

Body position

When in ready position the heels rest lightly on the floor with weight on the balls of the feet. The feet are shoulder width apart. Ball held in front of the waist in the fingertips of two hands. Fingers spread wide with thumbs and little finger on 'Line'. Thumbs Close together at the rear. Elbows held close to the body. Head is stationary and erect (Martin Spencer). Eyes are fixed on the target (Additional file 1: Step 1).

Joints movements

From the ready position, the elbows and knees joints start flexing which act as a lever to generate force for the action (Additional file 2: Step 2). The elbows and knees angle decreases which act as a lever (Third Class Lever), counter action of upper and lower extremities can be seen to balance the body. The upper extremities are moving backward and lower extremities are moving forward to maintain stability (Additional file 3: Step 3). The ball is at overhead with one line of the body before the elbow and knees start extending to get a highest range of motion (Additional file 4: Step 4).

I-phase

The next phase of action is I-phase. In this phase the throwing hand take alphabet "I- shape" when extended for skill execution (Additional file 5: Step 5 and Additional file 6: Step 6).

Body position

The throwing hand take I- shape when extended. The fingertips are used to release the ball to make it spin backward so that the ball remains near the rim (Kentridge School 2003; Cull, 2003; Willis, 2001) which allow the ball to continue in a vertical path allowing the ball to have a greater chance of going in (Additional file 6: Step 6).

Joints movements

The Elbows and Knees which acts as a lever (1st class) start extending to give force to the ball. The ball act as a load, elbow joint; Fulcrum and Triceps muscle; Force as shown in Additional file 5: Step 5.

Goodbye-phase

In this phase, the wrist was snap like waving "Good bye" to control the ball. Good-bye phase release of ball as the arms reach full extension. Premature release of the ball will result in a jerky shot. In contrast, full extension of the arms prior to releasing the shot permits wrist action to impart back spin and "soften" the basketball shot (Tarkanian, 2015).

Body position

The Elbows and knees are fully extended so that the body weight is transfer to the feet. The ball in the hand(s) is kept until the arms are extended fully. The wrist makes a follow through and the ball is release with the fingertips (Additional file 7: Step 7).

Joints movements

The Elbows and knees joints are fully extended before the release of the ball to transfer the body weight is to the feet. The wrist makes a follow-through which provides direction to the flight of the ball.

The video model which was constructed with the help of WLMM to analyse the set shoot in basketball can be seen from the link given below.

Click the link below for Video Based Analysis Teaching Video

<https://www.youtube.com/watch?v=dTHEqhfG-WE>

Discussion and importance of VBAT

Several researchers have investigated the efficacy of using video models within computer-based multimedia applications in different fields. It is used for teaching in mentally retarded students (Theresa Watkins et al. 1990), nurse students (R.E.-S.H. El-Sayed, S.E.-H.A.E.-R. El-Sayed 2013, Krouse 2001), medical practitioners (Leopold, et al; 2005, Braslow et al., 1997), mathematics classroom practice (Savola, 2008), teachers` education (Beacher 2013) and for pedagogical sound instruction (Dubrowski and Xeroulis, 2005; University of Queensland, Australia IT@LI). Video can be used as teaching tools (Carrol et al. 1999), feedback for the students (Suby, 2009; Chow et al. 2008), problem solving and analytical skills among students (Jonassen and Hernandez-Serrano, 2002; Shepard and Cooper, 1982) and assist in mastery learning (Galbraith, 2004).

Krouse in 2001 conducted a study video modelling/video instruction to nurses can also be beneficial and cost effective in delivering standardized information to more patients in a timely manner. He concluded that “the utility of video modelling instruction holds good promise for application to clinical practice in facilitating knowledge acquisition, reducing preparatory anxiety and improving self-care practices.” However, Theresa and co-workers (1990) studied on effects of video based training on spoken and signed language acquisition by students using both video plus therapist methods with mental retardation and found significantly higher sign production scores than the video only method.

Video instruction can also be utilized to enhance skills needed to develop proper techniques when administering a procedure, for example, Leopold, et al. (2005) discussed the confidence and competence of medical practitioners when executing an injection into the knee joint. The study concluded that even low-intensity forms of instruction could enhance a person’s confidence and competence when performing the skill.

Braslow et al. (1997) devised a video to teach CPR (Cardiopulmonary resuscitation) to students in their own home, which was used to train a group of lay people. After critiquing his videos and presenting the video instruction a second time to a different group, he concluded that both groups that had been presented videos as instructional tools performed CPR more competently and more effectively after training, than those that were only given the information from and instructor-led teaching method.

Another study by R.E.-S.H. El-Sayed, S.E.-H.A.E.-R. El-Sayed (2013), video-based lectures offer more successes and reduce failures in the immediate and follow-up measures as compared with the traditional method (without video) of teaching human

anatomy and physiology that was based on printout illustrations, but these differences were not statistically significant.

Harman (2012) in his workshop on Videos in Case-Based Teaching in the Sport Management Classroom suggested that Videos can be beneficial in the classroom for numerous reasons. Even in PE and Sports, the use of computer application has been drastically increasing in many develop countries as motor skill in PE cannot be learnt overnight. It is a progressive change that occurs as a result of observation, experience, or practice (Kamlesh and Sangral 1988, p. 3).

Blomqvist, et al, 2001, examined the effects of two forms of instruction, “traditional” and “traditional” plus strategy instruction (strategy-oriented), on students’ knowledge, game understanding, skill and game performance. The badminton players who received video-based strategy instruction for lessons were able to improve their badminton knowledge; game understanding and serving skill significantly whereas the group without video- based strategy instruction improved its badminton serving skill only. Dam (2012) video feedback may be a useful tool and should be aimed at utilizing that to improve instruction as well.

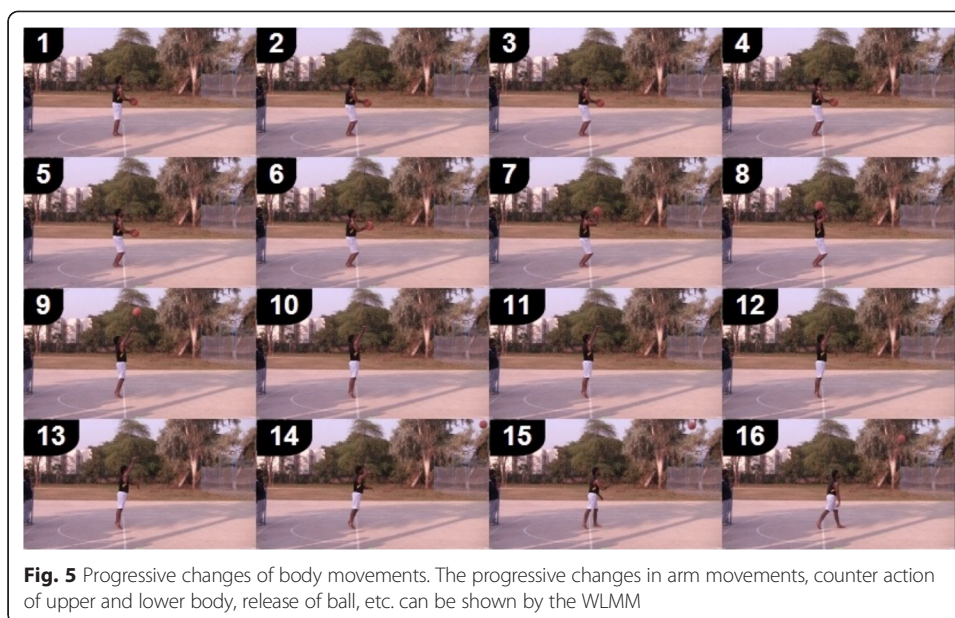
Importance of this video model

Many studies were conducted in different field of teaching showing the merits (Kearney and campbell 2010; Kearney and Schuck, 2006) and demerits (Karimi Mouneghi et al. 2003; Willis 2009) of using video in teaching and learning process, but fail to show the ways of constructing a video model. This video model will encourage the coaches/physical educators to create their own teaching video for the students.

Based on the discussion cited above, in this study on set shoot by used of WLMM, it has been noticed that there are many skills that are unnoticeable by the naked eye viz. progressive arms movements, release of ball with fingertips, counter action of upper and lower body, etc (Fig. 5). However, with the use of this VBA, each and every body and leverage movement of the joints could be analysed to note the minute details of the movement. Since learning and development of motor skill performance especially emphasizes on the cognitive set phenomena (Fitts, 1964), intelligence sensor motoric (Piaget, 1950) and orderly sequencing thinking (Bartlett 1958). Likewise, the learning of motor skill (Set Shoot) involves the visual perception of the skill, knowledge of progressive changes of the body, technique of the skill, etc to be performed and this could be only possible after showing the technique repeatedly by use of video teaching.

Furthermore, self - observation is essential for athletes as their proprioception might be limited or even misleading (Frossard et al. 2006). When participants are engaged in motor learning, this encourages them to search for further structure in the task, so it is easier for the learner to catch on the perceptual learning system (Deroost and Soetens, 2006). The video model shows the progressive action of the skill which is easy for the learner to understand the skill. Mayr (1996) confirmed perceptual and motor learning when sequences were learned concurrently. Chin-Yun Huang (2000), found that low-ability (motor educability) students had more positive attitudes than high-ability students and this could be possible by use of such video model in teaching.

Other supporter for video based learning is provided by the studies of Lyons, Reysen, and Pierce (2012) and Suby (2009) and Harvey and Gittins (2014). All of them



suggested use of video in online learning, videotape feedback in PE and integrating video-based feedback into teaching games into learning. They demonstrated that used of video learning enhance learning, create interest and efficacy of using video-based technology to improve game performance.

Video-based educational method alone is not effective as demonstration method but it can be a suitable substitution when we are not able to perform the demonstrating method or when it is not cost-effective (Karimi Mouneghi et al. 2003). However, cheng and colleague have found out that video-based education can be as effective as lecture-based instruction (Chen et al. 1998) and even sometimes better than that in different presentation method. This video model can highlight all those skills or body position which can be watch repeatedly by the learners`.

Conclusion

Using this video model (VBA) will offer varied opportunities as it allows performance to be paused, repeated, played in slow motion and can be used in all types of model-based practices like sports education. Players learn in different ways, at different rates and have different entry behaviours (Machar Reid 2009). Due to individual cognitive difference, some are quick learner while others are slow. Findings and statistics have shown that the best means of facilitating or enhancing good teaching and learning is through the use of both demonstration and instructional materials which encompass audio visual materials like video based analyses. Therefore, it is recommended to use both demonstration and video method in teaching the athletes in PE.

Limitation

Certain parameters like Velocity, Acceleration, Time of action, Angles, Distance/ Displacement, Momentum, Speed, etc cannot be analysed using this video method.

Appendix

Table 2 Operational Definition: Some defining operation related with the article are shown in Appendix: Table 2

Motor Educability	It refers to the ability- to learn or the cognitive capacity to learn new skills.
Digital High Speed Camera	A digital high speed camera is a device used for recording slow- motion playback films, or used for scientific study of transient phenomena.
Window Live Movie Maker	It is essentially a simple, easy-to-use video editor that helps you in putting together photos, videos, music and special effects to create an eye-catching presentation in a few' easy steps.
Video Based Analysis	The technique used to get information about moving objects from video.
Set Shoot	A two-handed basketball shot from a stationary position.
Motor Skill	It is a movement which involve the neuro- muscular coordination.

Additional files

Additional file 1: Step 1 Ready Position. (TIF 826 kb)

Additional file 2: Step 2 Flexing of elbows and knees to generate force. (TIF 737 kb)

Additional file 3: Step 3 Counter-action of upper & lower body to maintain balance. (TIF 656 kb)

Additional file 4: Step 4 Ball alignment in one line with the body. (TIF 1281 kb)

Additional file 5: Step 5 Lever action in set shoot in basketball. (TIF 1260 kb)

Additional file 6: Step 6 Release of ball with finger tips for backspin. (TIF 1231 kb)

Additional file 7: Step 7 Waving of wrist movement in Goodbye phase. (TIF 1310 kb)

Competing interests

The author declares that he has no competing interests.

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