UNIVERSITI PUTRA MALAYSIA

EFFECTS OF VIDEO MODELING ON GYMNASTICS ROUTINE PERFORMANCE

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfilment of the Requirement for the Degree of Master of Science

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DEDICATION

This thesis is dedicated to my eternal family especially my beloved granny
Madam Beh Kwee Choo, nanny Madam Yam Ah Hoe
and all who have gone before or will come after.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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Chairman: **Sheikh Kamaruddin Haji Sheikh Ahmad**

Faculty: **Educational Studies**

Modeling or observation learning plays an important role in transmitting information to the observer. Some sport skills such as skills in artistic gymnastics need explicit visual demonstration for the purpose of coaching and training. Hence, videotapes are sometimes used to facilitate the learning process. However, there is limited agreement from previous studies on the effectiveness of video modeling. The purpose of this study is to investigate the effects of video modeling versus non-video modeling on routine performance of female gymnasts who participated in a gymnastics development program managed by National Sports Council of Malaysia.

Twenty-four subjects between the ages of 8 to 15 years (M = 11.13, SD = 2.08) from a group of 67 gymnasts were chosen at random from the gymnastics centers around Malaysia. The subjects in each center were matched and randomly assigned to either the video modeling (experimental) group or the non-video modeling (control) group. Both the experimental and control groups attended their normal gymnastics

training program. The experimental group was given the opportunity to watch 15 hours of video clippings in three sessions of half an hour per week over a 10-week period while the control group attended gymnastics training only. The video modeling sessions comprised of female gymnasts participating in the Olympic Games (Sydney), Commonwealth Games (Manchester), World Championships (Ghent), and other international championships. The researcher videotaped pretest and posttest performance of each gymnast on the two gymnastics events at each center. Subsequently, two top Malaysian women's judges evaluated the 192 routines performance recorded (24 subjects x 2 rotations x 2 events x 2 tests) according to the Federation Internationale de Gymnastique (FIG) rules.

Findings indicated that there was a statistically significant difference on overall gymnastics performance in the video modeling group ($t = - 5.201$, $p < .05$) when the pre-posttest scores were compared but not likewise in the control group ($t = 1.774$, $p > .05$). Subsequently, the two events in the experimental group indicated significant differences of performance based on pre-posttests final average scores while none of the events in the control group were significantly different in performance.

The findings of this study suggest that video modeling does affect the routine performances of gymnasts over a period of at least 15 hours, resulting in higher scores based on pre-posttest comparisons. In conclusion, video modeling sessions provide additional opportunities for learning skills in artistic gymnastics to a certain level beyond those provided via practice alone.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains

KEBERKESANAN PERAGAAN VIDEO TERHADAP PERSEMBAHAN RUTIN GIMNASTIK

Oleh

CHING JOO LAN

November 2006

Pengerusi: **Sheikh Kamaruddin Haji Sheikh Ahmad**

Fakulti: **Pengajian Pendidikan**

Peragaan atau pembelajaran pemerhatian memainkan peranan yang penting dalam menyebarkan maklumat kepada permerhati. Terdapat beberapa kemahiran sukan seperti kemahiran dalam gimnastik artistik yang memerlukan demonstrasi visual secara eksplisit. Kadang-kala kaset video digunakan untuk mempercepatkan proses pembelajaran. Walau bagaimanapun, hanya terdapat beberapa persetujuan dari kajian lampau tentang keberkesanan peragaan video. Selanjutnya, kajian ini bertujuan menyelidik kesan peragaan video berbanding dengan tanpa peragaan video terhadap persembahan rutin di kalangan gimnas perempuan yang mengikuti program pembangunan gimnastik yang dikendalikan oleh Majlis Sukan Negara Malaysia.

Seramai 24 daripada 67 ahli gimnas yang berumur antara 8 tahun hingga 15 tahun (M = 11.13, SP = 2.08) dipilih secara rawak dari pusat gimnastik sekitar Malaysia sebagai subjek. Semua subjek di setiap pusat dipadankan dan diagihkan secara rawak kepada kumpulan peragaan video (eksperimental) atau kumpulan tanpa

peragaan video (kawalan). Kedua-dua kumpulan eksperimental dan kumpulan kawalan menjalani latihan gimnastik program masing-masing. Kumpulan eksperimental berpeluang menonton selama 15 jam tayangan video. Tayangan video ditonton sebanyak tiga sesi seminggu dengan setengah jam setiap sesi dalam tempoh 10 minggu manakala kumpulan kawalan menjalani latihan gimnastik sahaja. Sesi peragaan video terdiri daripada gimnas wanita yang bertanding di Sukan Olimpik (Sydney), Sukan Komanwel (Manchester), Kejohanan Gimnastik Dunia (Ghent), dan Kejohanan Gimnastik Antarabangsa yang lain. Penyelidik sendiri merakam persembahan praujian dan pascaujian setiap gimnas yang merangkumi kedua-dua acara dalam kajian ini di pusat gimnastik masing-masing. Selanjutnya, dua orang hakim wanita terbaik Malaysia menilai sebanyak 192 persembahan rutin yang dirakam (24 subjek x 2 pusingan x 2 acara x 2 ujian) berdasarkan peraturan Persekutuan Gimnastik Antarabangsa (FIG).

Dapatan kajian ini menunjukkan bahawa terdapat perbezaan yang signifikan secara statistik dalam kumpulan peragaan video berdasarkan persembahan gimnastik keseluruhan ($t = -5.201$, $p < .05$) apabila analisis pra-pascaujian skor dilaksanakan tetapi tidak begitu untuk kumpulan kawalan ($t = 1.774$, $p > .05$). Selanjutnya, kedua-dua acara dalam kumpulan eksperimental memperlihatkan perbezaan yang signifikan berdasarkan persembahan pra-pascaujian purata skor akhir sementara tidak wujud satu acara pun dalam kumpulan kawalan yang memperolehi perbezaan persembahan yang signifikan.

Dapatan kajian ini mengesyorkan bahawa peragaan video memberi kesan terhadap persembahan rutin gimnas dalam jangkamasa sekurang-kurangnya 15 jam ke arah pencapaian skor yang lebih tinggi berdasarkan perbandingan persembahan pra-pascaujian. Secara kesimpulan, sesi peragaan video berkemampuan memberi peluang tambahan untuk mempelajari kemahiran dalam gimnastik artistik ke suatu tahap yang tertentu iaitu mengatasi perbezaan persembahan yang diperolehi melalui latihan gimnastik sahaja.

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Finally, I must acknowledge the endless inflatus and motivation from Dr. Callum Spencer Durward, despite his personal obligations, had proof-read parts of the draft towards the completion of this thesis. Thank you from the bottom of my heart.

I certify that an Examination Committee has met on 14 November 2006 to conduct the final examination of Ching Joo Lan on her Master of Science thesis entitled "Effects of Video Modeling on Gymnastics Routine Performance" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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Date: 16 JANUARY 2007

DECLARATION

I hereby declare that the thesis is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

CHING JOO LAN

Date: 20 DECEMBER 2006

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LIST OF ABBREVIATIONS

ANCOVA	Analysis of covariance
ANOVA	Analysis of variance
BB	Balance beam
CG	Control group
CMVD	Correct model plus video descriptions
FAS	Final average score
FIG	Federation Internationale de Gymnastique
KR	Knowledge of results
LMVD	Learning model plus video descriptions
MANOVA	Multivariate analysis of variance
MG	Modeling group
NSC	National Sports Council of Malaysia
SV	Start value
UB	Uneven bars
VD	Verbal descriptions
VDG	Verbally directed group
VMBR	Visuo-motor behavior rehearsal
WTC	Women Technical Committee

CHAPTER I

INTRODUCTION

Motor skill acquisition can be thought of as a gradual harmonizing of a number of complicated processes in order to achieve a consistent output. According to Summers (2004), the last decade has seen the beginning of a systematic attempt by researches working within a dynamical system framework towards building a comprehensive theory of motor skill learning that has specific implications for practice organization. People are thought of as a system that resulted in an end product of movement or behavior (Dynamic Systems Theory, n.d.). This system is made up of many cooperating and sometimes competing subsystems that can be internal to the learner or external such as organismic (learner), task, and environment. The principle of dynamic systems refers to the influence of many interacting subsystems where each with its course of development and proceeding at its own rate on the behaviors. Associating learner and dynamic systems theory results to autonomous ability to seek stable solutions that may be more complex, efficient, and effective such as from inconsistent to consistent or from less mature patterns to more complex patterns. Subsequently, new forms of behavior arise out of old forms. The perturbations disrupt the stability in old forms and give rise to new behavior as well.

The learning of a single-degree-of-freedom rhythmic bimanual coordination patterns as mentioned by Summers (2004) is focused in the area of coordination dynamics. It features that all learning occurs against a background of existing capabilities. There existed a collective variable that compress the multiple degree of freedom (Dynamic Systems Theory, n.d.). For example, balance in a skill performed is referred as a variable of the collective variable that influences stability (less degree of freedom). It is the observation of the collective variable over time that is of interest to the dynamic systems theory researches as a means to explain changes in movement. Summers continued that there has been the mapping of a learner's attractor landscape prior to learning and monitoring changes to the landscape during the learning of a new coordination pattern. The attractor landscape is like a movement signature that reflects a learner's behavioral history and pre-existing abilities as he or she experiences during the learning situation. In other words, attractors result from the cooperation of many subsystems operating and influencing a learner. The constraints within the learner (intrinsic dynamics) influence the acquisition of new coordination and vice versa (Dynamic Systems Theory, n.d.; Huys, Daffertshofer, & Beek, 2004; Nielsen, 2005).

Much of our learning movement comes as the result of attempts to reproduce what we see in many ways. Subsequently, whoever has attempted to communicate how sports skills should be performed, understands the crucial role visual demonstrations play in performance and learning. Most sports skills are not easily described in words, neither can verbal instructions be easily given and translated

into action. In other words, one of the instruction strategies refers to the visual means of relaying information. Invariably, the best teaching mode in conveying how sports skills should be performed is to say, "See how I do it." Thus, the athlete can visualize the skills observe how they can be coordinated into a flowing movement.

Good companions to instructions are various forms of visual information, such as still pictures of proper actions; film clips or videotapes of successful performances; and demonstrations provided by the instructor, the therapist, or some other skilled individual (sometimes referred to as modeling). The familiar phrase "A picture is worth a thousand words" seems to be particularly true when it comes to the learning of motor skills, because movement information can often be more easily transmitted by visual demonstration than by a verbal description (Schmidt & Wrisberg, 2000). Specifically, Magill (2004) stated that the observer perceives and uses invaried features of the coordinated pattern to develop his or her own movement pattern to perform the skill. Since visual information is such a powerful means of conveying information about sports skill in particular, demonstration is one of the most common instructional strategies for broadening the physical skill repertoire of children, adolescents and adults. Demonstrating the skill by oneself, watching another student in the class demonstrating the skill, or watching a videotape of someone doing the skill are forms of demonstration. Learning researchers and theorists refer to these forms of demonstration as modeling or observational learning (Magill, 1993).

There is a substantial amount of research investigating the relationship between modeling and motor performance. For example, the efficacy of attention mechanisms (McCullagh, 1986; Weiss, 1983), retention capabilities (Weiss & Klint, 1987), motor reproduction skills (Feltz, 1982), and motivational requirements (Gould & Weiss, 1981; Little & McCullagh, 1989) for producing modeling effects on motor behavior has been demonstrated. There were also studies that examined the effects of modeling in the physical domain from a developmental perspective (McCullagh, Stiehl, & Weiss, 1990; Thomas, Pierce, & Ridsdale, 1977; Weiss, 1983; Weiss, Ebbeck, & Rose, 1992; Weiss & Klint, 1987). In summary, we could consider that proper visual demonstration or modeling is vital for learning complex motor skills such as in gymnastics. Visual demonstration conveys a vast array of information cues that are far more relevant to facilitate an observer's motor skill acquisition than information conveyed through verbal instruction (Catina, 2004).

Artistic gymnastics requires accuracy in executing movements that affect the scores of each routine. Though Horn, Williams, and Scott's (2002) findings on the observation of a model did not facilitate outcome-based learning, there was a significant main effect for the test period for outcome accuracy and variability. Participants observing the model acquired a global movement pattern that was closer to that of the model than the controls. In the study of Al-Abood, Davids, and Bennett (2001), kinematics analysis revealed that visual demonstrations significantly improved participants' approximation of the model's coordination

pattern when compared with verbal instruction versus no instruction (control group). Thus, demonstration by a model could be one of the most important instructional strategies in gymnastics.

Executing movements with the correct technique has been suggested as the best way to transmit the appropriate information for the tasks. Nevertheless, a careful investigation carried out in a laboratory showed that having a model in the skill acquisition phase might speed up the acquisition of skill and increase the capability of long-term memory compared to using the technically correct movement demonstration. This influenced McCullagh and Meyer (1997) to study the effectiveness of executing movements with correct techniques and having a model in the skill acquisition phase. The results of the research showed that there were no differences between model with correct techniques movements and model in the skill acquisition phase. Their findings were in line with Pollock and Lee's (1992) research that compared skill acquisition following observation of a learning model or a skilled model to the performance of subjects who lacked the benefit of observing any model. They found that there were no differences between observing the skilled model or the learning model. In the most recent research conducted by Adams (2001), the quality of the motor reproduction and the accuracy of the cognitive representation were assessed between a learning model and a skilled model. The results of this study indicated that the three instructional strategies, namely: correct model plus verbal descriptions (CMVD); learning model plus verbal descriptions (LMVD); and verbal descriptions only (VD) can be used to

foster motor skill development among preadolescent children, between the age of 8 to 10 years, particularly when the skill to be learned had already been vicariously experienced but not yet mastered.

The usage of video technology assisted the studies conducted by Polansky (2000), Atienza, Balaguer, and Garcia-Merita (1998), as well as Hall and Erffineyer (1983). Polansky designed a study to determine whether differences in task performance and self-efficacy of high school wrestlers (n = 36) were elicited through the use of live coach modeling, video coach modeling, or peer modeling. They reported that the implications of the modeling, and treatment period differences provided rationale for the inclusion of peer models in the classrooms of interscholastic sports. In a pilot study conducted by Atienza et al. (1998), the effects of video modeling and imagery training over 24 weeks on tennis service performance were analyzed. The posttest comparisons between groups indicated that there was a significant difference between the group given physical training only compared to the group given physical plus watched video modeling mental training. This is interpreted that physical plus watched video modeling mental training did facilitate tennis service performance. However, there was no significant differences between the physical training plus watched a video modeling mental training group and the physical training plus video modeling plus imagery mental training group. Hall and Erffineyer studied the effect of visuo-motor behavior rehearsal (VMBR) with videotaped modeling on free throw accuracy in basketball. The results offered empirical support for the efficacy of VMBR modeling in improving shooting

accuracy of highly skilled basketball players. These studies demonstrated that video modeling had been widely used and have played an important role in teaching motor skills.

Weiss et al. (1992) investigated the observational learning process from a developmental perspective. "Model only" was one of the three model types conducted that extended the previous research by considering two factors: performance versus learning and sequencing versus form scores. Older children, referring to 8-0 to 9-11 year olds, performed equally well under any of the model type conditions on both sequence and form scores during performance and learning phases. Emmen, Wesseling, Bootsma, Whiting, and Van-Wieringen (1985) used three experimental groups to test the effectiveness of video mediated instruction on the learning of the tennis service by novices. Again, video modeling played the role as the control group. The video modeling group was compared to the video-feedback group and the combination of video modeling plus video feedback group. The results showed no clear advantages of using any of these instruction methods of teaching. In other words, video modeling as one of the instructional methods in Emmen et al.'s (1985) study had a similar effect as the video-feedback and video model plus video feedback methods on the learning of tennis service by novices. Subsequently, Farrow and Kemp (2001) found that improvements could occur by simply curling up in front of the television to watch tennis games.

These few modeling studies were either referring to studies that combined modeling with self-efficacy, imaging training, verbal rehearsal or correct model versus learning model. The present study is different where having video modeling sessions refers to the experimental group but the control group refers to the group without having video modeling sessions.

Statement of the Problem

The level of performance among the female gymnasts in the gymnastics development program of National Sports Council of Malaysia (NSC) was improving at a slow rate based on the scores awarded in the gymnastics championships they participated locally. It was also been observed that their training hours were solely on training gymnastics skills. Their coaches usually explained verbally on the proper techniques required in executing the skills. However, some of the movements or skills in artistic gymnastics require complex coordination and explicit visual demonstration to enhance the learning process. As such, gymnastics coaches may not be able to demonstrate the correct technique or explain adequately. With the advancement in technology, sports and games competitions or championships were telecast through the television. It is then possible to tape the clippings shown and later use the clippings as an instructional tool towards acquisition of skills. Hence, from a practical perspective, it is a good start by just watching video modeling as the video modeling of gymnasts participating at world and international standard is accessible with the current