

# The Efficiency of Multimedia Educational Tools in Sport Gymnastics for The Students of Physical Education at Universities

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**Abstract**—This contribution was developed from a research within the doctoral thesis. Its object was to create multimedia materials for sport gymnastics. Consequently we surveyed the influence of its practical application on the efficiency of schooling at a university. We verified the prescribed hypothesis of the efficiency of the teaching process using the method of single-factor experiment, where the entrance independent variable was the change of system of tuition and the outgoing dependent variable was the change of level of acquired motor skills. The results confirmed the positive impact of using multimedia materials on the efficiency of the teaching process. Further, with the aid of questionnaires, we evaluated how the tested subjects perceive the innovative methods in sport gymnastics. The responses showed that the students rate the application of multimedia materials very positively.

**Keywords**—efficiency of education, means of education, multimedia materials, sports gymnastics

## I. INTRODUCTION

SOCIAL, scientific, and technical progress touches all the fields of life in our society. Therefore it cannot avoid physical education and all its parts. There has currently occurred a significant problem how to increase the efficiency and how to modernize the educational process of sports.

It is necessary to use new didactic approaches within this new concept. These approaches are not only more attractive for the students but they also help to increase the efficiency of the educational process at schools. As an example of this we can use the international studies of a subject called “Fitness and Wellness“ at the Faculty of Physical Education and Sports in Olomouc, University of Palacký [1].

New methods and approaches to the teaching of sports gymnastics will help the teachers, students and trainers to gain correct images how to train this technically aesthetic sport with a vast number of motion skills.

## II. PROBLEM

The question is if these new methods along with the new multimedia course book increase the efficiency of the educational process.

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Mazal [2] or Fróml [3] dealt with the problem of educational efficiency in our country. Frómel [3] defines the efficiency at physical education as a level of success during trainees performance in given tasks. Keeping with this idea, we are going to focus on a physical education project, modernization of the contents and working methods. Other factors that influence the efficiency of educational process – teacher, pupils and conditions – will remain unchanged. We are going to use the level of basic gymnastics skills [4]-[7] as the criteria of efficiency.

Previous research dealing with the use of computer in gymnastic training proved a positive impact of using computer and recording technology in the lessons [8]-[12].

## III. AIMS AND HYPOTHESES

The main aim of this project was to create a modern multimedia course for sports gymnastics and verify its efficiency in the training of physical education students at the Department of Education, University of South Bohemia.

### A. Sub Aims

- 1) Create a modern multimedia course book on the base of scientific knowledge and similar foreign materials.
- 2) Fit these multimedia materials into the system of education of experimental students groups at the faculty of education for the time period of two semesters and therefore verify its use in practice and evaluate the students' relation to the new approaches in education.
- 3) Verify the given hypotheses about the efficiency of the educational process with the method of single-factor experiment where the entrance independent variable is the change of educational process and the output dependent variable is the change in the level of gained motor skills.

### B. Hypothesis

#### Hypothesis 1:

We expect that fitting a new multimedia aid into the common education system of sports gymnastics of men will increase the efficiency of the educational process. It means that the experimental group of men will be able to master motor skills better than the control group during the same period of time.

#### Hypothesis 2:

We expect that fitting a new multimedia aid into the common education system of sports gymnastics of women will increase the efficiency of the educational process. It means that

the experimental group of women will be able to master motor skills better than the control group during the same period of time.

### C. Research question

How will the students evaluate these new approaches of fitting the new multimedia materials into the habitual education of sports gymnastics?

## IV. PROCEDURE FOR PAPER SUBMISSION

The hypotheses were verified with students of KTVS PF JU during two semesters of their gymnastic training. Experimental and control groups were made by parallel groups of the second year, both male and female, students. The total number was 26 men and 30 women which makes a complete file of 56 individuals aged about 21.

There are significant differences in motor skills among the students who come to study physical education. That is why the experimental and control groups with the approximately the same presumptions for acquiring the staff matter were created on the base of five entrance tests (dexterity test, Brace test, repeated hip swings up, long standing jump and simple floor exercises). The tests were chosen in accordance with the sports gymnastic requirements for PE students at faculties of education. They had to be completed with flexibility and other tests for professional gymnasts.

Basic principal of the experiment was in the verification of the given hypothesis with the method of single-factor experiment. As a typical example we can state the change in the level of motor performance (change of researched subject) as a result of change in the educational method (change of one factor) [13], which was also in this case.

“We are trying, according to our hypothesis, to evoke the change in output variables (so called experimental effect) by a manipulative change in entrance variables (so called experimental factors). Therefore the experiment comes close to possibility of detecting the causal relation“[14].

*The entrance independent variable in our experiment was the change in educational method of experimental groups. Output dependent variable was the difference in the quality of acquired motor (sports) skills between experimental and control groups.*

For verification we used a single-factor dispersion analysis completed with U-test of Mann and Whitney [15]. “Some tasks can be evaluated in both, parametric and non parametric ways. The same results then make our conclusions sound more prospective“[14].

*The schedule of the work was as follows:*

- multimedia course book of motor skills was created
- students of the second year of KTVS PF JU took part in standard entrance tests (5 tests); based on these tests the students were divided into experimental and control groups
- schedules of the education of both, experimental and control groups of men and women were processed (along with the usage of multimedia course book) and this programme was set in their lessons for two semesters

- then an output measuring took place; all participants' compulsory sets of exercises were evaluated by an unbiased committee of referees
- questionnaire was used to sound out the students' relation to the new method and used multimedia materials
- the data were used to compare the groups and the results were statistically processed on the base of the single-factor dispersion analysis completed with U-test of Mann and Whitney. For statistical evaluation we used textbook Seberová, Sebera [16].

## V. RESULTS AND DISCUSSION

We used a graph to compare the differences in performance between the experimental and the control group of men. It shows us that the smallest difference was at vault and rings (see Fig. 1).

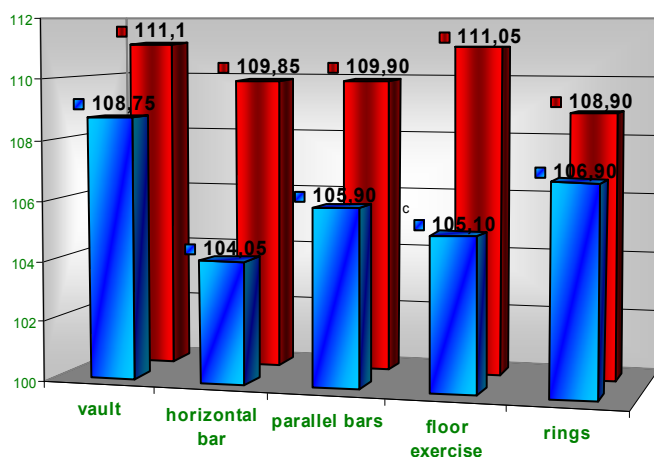


Fig. 1 Difference in scores in single apparatus in experimental (red) and control (blue) groups of men

Generally, there are very good presumptions for men (field of study PE) to master vault (speed, take off, they are not frightened). Therefore the increase in performance is lower. The set of exercises for rings is technically quite easy so even if there was better entrance information it does not bring a significant difference in performance.

On the other hand, the highest differences were at horizontal bar and floor exercises. The elements of the sets are technically very demanding and the experimental group was far better in their performance than the control group.

We used a graph to compare the performance of the experimental and control groups of women at different apparatus as well. (Fig. 2). There you can see that unlike with men, the most significant difference was at vault.

However it again comes out of their presumptions for mastering this apparatus. Women lack the abilities men possess. Speed, take off, courage. To see a video recording repeatedly helps gain the feeling of the optimal run-up speed and may partially dispose them of fear. Therefore the difference in points is extremely high.

There are generally lower point gains at beam with both groups, because of the 0.5 point loss for each falling down.

The highest score of the control group is at horizontal bar, because there are not any elements that are especially difficult for female students.

The situation is similar with floor exercises and the difference in score is also not as significant as with man. The most difficult part is the handspring forward which women can handle better than men.

In conclusion we can say that it is visible that multimedia materials, which explain the technique in close detail, are most useful with technically demanding disciplines. They can also be applied in disciplines where they enable fast and exact idea about a motion operation. Run-up – take off – vault, correct timing, correct speed.

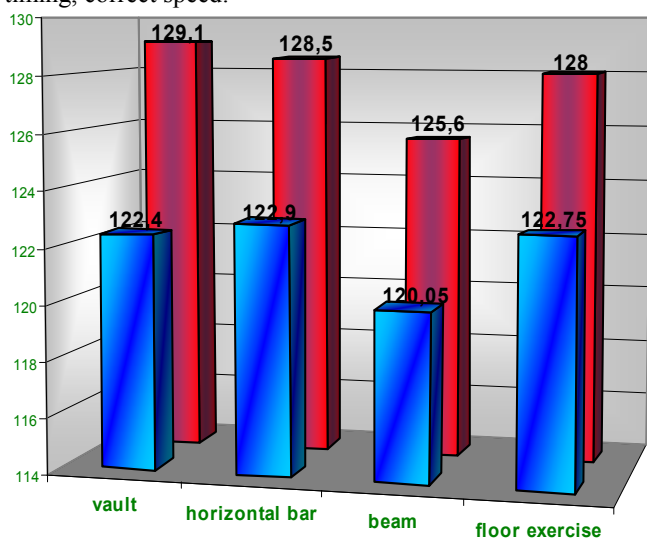


Fig. 2 Difference in scores in single apparatus in experimental (red) and control (blue) groups of women

## VI. CONCLUSIONS

The main aim of this project was to create a modern multimedia course book for sports gymnastics and verify the efficiency of its use at the education of students of physical education at the Department of Education, University of South Bohemia. This aim was accomplished.

1) Modern multimedia course book of sports gymnastics was created on the base of available scientific knowledge and similar foreign materials. Its use was verified in practice. These materials proved to be convenient and sufficient for this type of school.

2) Students' relationship to the new approaches was evaluated with the help of a questionnaire. Therefore the question of how the students will feel about the new teaching methods was answered. The students responded mostly positively and in most cases they would welcome education with multimedia materials also in other subjects and activities.

3) Given hypotheses about the efficiency of educational process were verified with the method of single-factor experiment where the entrance independent variable was the change in educational process and the output dependent variable was the change in the level of acquired motor skills.

The results we gained enable us to accept the hypothesis (H1) concerning the experiment with men and the hypothesis (H2) concerning the experiment with women. Introducing the multimedia materials into the system of habitual education of sports gymnastics of men and women will increase the efficiency of this process. It means that experimental groups will be able to perform various gymnastic skills at better quality than control groups after the same period of time. Confirmation of the hypotheses (H1, H2) for men and women is valid also thanks to the same results of parametric and non parametric methods of single-factor experiment [13].

## REFERENCES

- [1] F. Mazal, "Využití e-learningu studenty tří států" in *Sborník BELCOM 2006*. Praha: ČVUT, 2006.
- [2] V. Kulič, "Některá kritéria efektivity učení a vyučování a metody jejího zjišťování" In: *Pedagogika*, no. 6, pp. 677-698, 1980.
- [3] K. Frömel, *Efektivita výchovně vzdělávacího procesu v tělesné výchově*. Olomouc: Univerzita Palackého, 1987.
- [4] M. Zítko, *Všeobecná gymnastika*. Praha: ČASPV, 2004.
- [5] M. Zítko, J. Chrudimský, J. Akrobacie. Praha: ČASPV, 2006.
- [6] Z. Tůma, M. Zítko, M. Libra, *Kapitoly o gymnastice (I)*. Praha: ČOS, 2004.
- [7] J. Křištofič, *Náradová gymnastika*. Praha: ČOS, 2008.
- [8] M. Koh, K., Anwari, "Integrating video and computer technology in teaching – An example in gymnastics initial PE teacher training programmes in Singapore" in *British Journal of Teaching Physical Education*, vol. 35, no. 3, pp. 43–46, 2004.
- [9] R. A. Schmidt, C. A. Wrisberg, C.A. *Motor learning and performance*. 3th Ed. Champaign, IL: Human Kinetics, 2004.
- [10] J. L. Ching, *Effects of Video Modeling on Gymnastics Routine Performance*. 2006. Retrieved 20. 9. 2011 from <[http://psasir.upm.edu.my/9398/1/FPP\\_2006\\_18\\_A.pdf](http://psasir.upm.edu.my/9398/1/FPP_2006_18_A.pdf)>
- [11] R. A. Magill, *Motor Learning and Control: Concepts and Applications*. 6th Ed. New York: McGraw-Hill, 2006.
- [12] E. Boyer, R. G. Miltenberger, C. Batsche, V. Fogel, "Video modeling by experts with video feedback to enhance gymnastics skills" in *Journal of Applied Behavior Analysis*, vol. 42, no. 4, pp. 855-860, 2009.
- [13] R. Kovář, P. Blahuš, *Aplikace vybraných statistických metod v antropomotorice*. Praha: SPN, 1989.
- [14] P. Blahuš, *K systémovému pojetí statistických metod v metodologii empirického výzkumu chování (Vybrané kapitoly pro doktorandy)*. Praha: Karolinum, pp. 211, 1996.
- [15] M. Chráska, *Základy výzkumu v pedagogice*. Olomouc: Vydavatelství Univerzity Palackého, 1998.
- [16] H. Seberová, M. Sebera. *Počítačové zpracování dat II*. 1. vyd. Vyškov: VVŠ PV, 1999. 134 s. ISBN 80-7231-052-6.