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**NEW COMPETENCIES FOR PHYSICAL EDUCATION TEACHERS: SOFTWARE
FOR MOVEMENT ANALYSIS**

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Abstract: *ICT development in recent decades has led to important changes in all fields, including education. These changes are reflected also in the curriculum of initial and continuing training of teachers. Disciplines such as IT, computer assisted instruction, within initial curriculum, or training programs for continuing education are specially designed to meet the demands of the contemporary society. In above mentioned context, this paper aims to highlight the professional opinion on whether teachers use ICT in teaching and the characteristics of one of the main applications of ICT in education in physical education and sports, namely, to support the evaluation of motor actions.*

Keywords: *ICT, physical education, sport, movement analysis*

I. INTRODUCTION

1.1. Early researche

The analysis of movement is one of most important aspect of Human Motricity Sciences/Kinesiology. One of the first authors which put emphasys on the necessity of human movement is Huelster, which since 1939 has underlined that the information gained by future scientists in domains like anatomy, biomechanics, kinesiology, will not cover the area of neccessarily competence of real time analysis of human motion. These conclusions were later made stronger by studies in the 70 by Barrett (1979) and Locke (1972), and in 90 by Knusdon, Morrison and Reeve (1991). (quoted by Nielsen and Beauchamp, 1992) [1]

On the other side, it has been contested that the best sportsmen do not necessarily become the best in the domain of the analysis of motion. This conclusion, that a great kinestezic sense will not become an ability of quantitative analysis of motion, has been introduced in studies by Girardin and Hanson (1967), Osborne and Gordon (1972), Armstrong and Hoffman (1979) (quoted by Nielsen and Beauchamp, 1992). [1] Nielsen and Beauchamp (1992) have identified also the fact that a conceptual type of training (type of general biomechanical principles) increases the accuracy of correction and the specific feedback brought by students which were analysing films mode during volley and handball matches from the perspective of biomechanics. [1]

1.2. Curriculum approach

Sidentop (1991) has underlined that in relation with teaching methods used in Physical Education and Sports, the systematical observation refers to the observing and classifying the teachers and students behaviour in the process of evolution of teaching, but less in the qualitative analysis of motion. [2] However, the 90's bring a rising interest for the evolution of competences that aim the analysis of motion. This has turned into a reason for which study disciplines were introduced in the

curriculum for individual training of experts. This attitude is the results of studies which promote the analytic models of analysis, based on the relation between observed performances and expected one (as a consequence of mental image of evaluator). Motion analysis will have important temporal, spatial co-ordinations, and also key moments of practical performance. An important variable which influence the motion analysis result is referring to the specialists' experience. Based on his capacity to observe and to correct the reference model, the final analysis will have a certain level of quality. At the beginning of the 21 century, three seems to be the dominants in training specialists in motion analysis area: curriculum development, interdisciplinary approach, learning and research in movement analysis research area. [3] [4] [5]

1.3. Armed observation in physical education and sport

Modern human movement analysis represents the interpretation of computerized data that documents an individual's upper and lower extremities, pelvis, and trunk motion during movement. Movement analysis is automatically a part of human performance assessment and analysis. For decades, taking moving pictures and processing them, was the primary method for determining the movement of athletes. In the past 25 years, the development of technology and computer science has made it easier to analyze human movement. Nowadays, in many sports, sports scientists use movement analysis as a tool to enhance techniques, correct movement errors, assess metabolic costs related to a variety of movements, and aid in rehabilitation. Modern computerized systems of movement analysis generally consist in placing special markers on the subject that will transmit data from their position in space to receiver devices. [6]

II. PURPOSE

This paper aims to highlight the professional opinion on whether teachers developed their competences to use ICT and the characteristics of one of the main applications of ICT in physical education and sports, namely, to support the analyze and the evaluation of motor actions.

III. TOPIC

3.1. Physical education teachers vs. Software for movement analysis. In order to analyze this relation, we designed a research within the continuous education program *ICT Applications to Teaching in Physical Education and Sports*. Teachers enrolled at this program had followed some disciplines which offered different learning experiences in this area. In order to analyze the perceived level of importance for each discipline included in program curriculum, and, based on this feedback, to improve a future educational offer, we apply an opinion questionnaire.

Methods of research and target group. This questionnaire included 7 items and was applied to a number of 109 teachers participating into the above mentioned program. The group profile is presented bellow (table 1)

Table 1. Teachers groups' profile								Years of teaching experience		
	Didactic degree				School level			< 5	5 - 10	>10
	First degree	Second degree	Definitive degree	Debutants	Primary level	Secondary level	High school			
Number of teachers	25	43	35	8	26	45	38	13	50	37

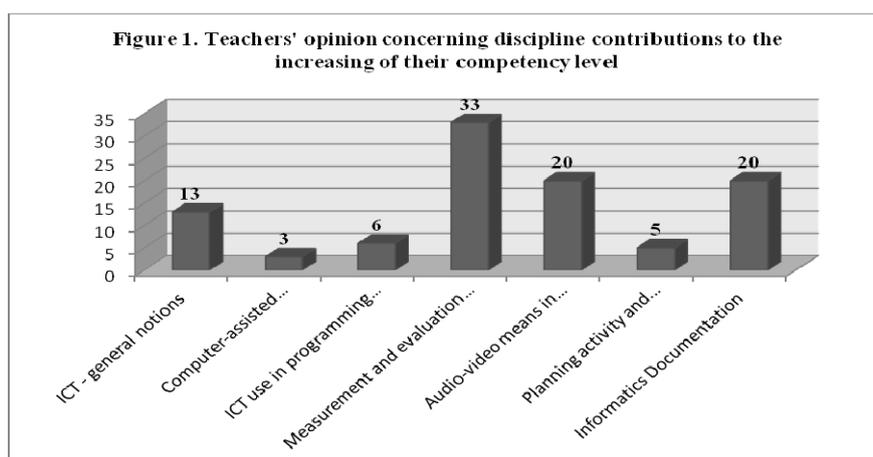
The questions put in evidence the following variables: contributions of each discipline to improvement of competences level, rate of using ICT in teaching physical education and sport, self-perceived level of efficiency in ICT, interest in participating in future continuing education program in ICT area. These variables were analyzed in relation with years of teaching experience, didactic degree, school level where they teach, by using SPSS.

Results. At the first item, we found the following results, presented in table 2.

Table 2. Teachers opinion concerning discipline contribution to their competences level

Study Discipline	First option (percentage)
ICT - general notions	13
Computer-assisted instruction in physical education and sports	3
ICT use in programming activities specific to physical education and sports	6
Measurement and evaluation in physical education and sports through ICT means	33
Audio-video means in physical education and sports	21
Planning activity and management in physical education and sports by using ICT	5
Informatics Documentation	19

As it can be observed in table 1 and figure 1, the main perceived contribution was brought by Measurement and evaluation in physical education and sports through ICT means (33%). In the same time, Audio – video use in physical education and sport, and Informatics Documentation, had important percentages (21% and 19%). Excepting the third discipline, the first two are important in this paper context, because are referring to our subject interest, movement analysis and evaluation. Further information about this education program showed that students were much interested in the analysis software presentation, because they had been confronted to this necessity in their professional activity. Even the teachers recognized these disciplines contributions to their new level of competencies, only 25% of them use ICT in their current activity. It is interesting that most of the teachers (60%) that expressed these two options have between 5 to 10 years of experience in teaching physical education. So, they are interested about the topic, at the beginning of their career, but the effective using of ICT means are still reduced.



Keeping in mind the same category of respondents, they appreciate their level of training as high (80%) and the same is their interest in participate to future continuous education program (62%). Most of teachers with more than 10 years teaching experience are interested in ICT - general information. This option is a consequence of the missing part about ICT, from their initial and

continuous curriculum. Their interest to participate in future program on this topic are quite low (16%).

3.2. Software for movement analyze

Within the discipline which obtained most options of participating teachers at the program, there were presented some movement analyze software, such as: Eagle Digital Camera, Motor Skills Testing Siliconcoach Live, and Kinovea software. The last software was the most accessible. During the theoretical and practical activities, there were presented the main functionalities and developed competences which helps specialists to create their video collections, to display files as animated thumbnails; to use the drawing tools in order to enrich the video by adding arrows, descriptions and other content to key position; to use the line and chronometer tools in order to measure distances and times; to compare two performances side by side and a videos by using a dual screen mode that can be synchronized on a common event for dynamic comparison. (figure 2).

Figure 2. Exemples - Kinovea functionalities



In the same time, the teachers have succeeded to describe the actual movements which occur at the joints involved, to define the planes in which the movement occurs, to define the muscles producing the movement, to present the function of the muscles involved (agonists, antagonists, synergists), to recognize the type of contraction (isotonic -concentric or eccentric, isometric), to mention the range of the muscle action (inner, middle, outer).. By using of modern movement analysis, researchers may help fine-tune everything from running, jumping, and shooting. So, teachers developed their competences in two directions: in their specialty area, and in using a certain software one.

Detailed analysis of movement is a complex activity requiring sophisticated equipment. That is why teachers who understood this aspect appreciated the study discipline *Audio-Video use in Physical Education and Sport*.

IV. CONCLUSIONS

Students' attendance of the seven disciplines included into training program gave them the opportunity to express their need to highlight the direct applications of knowledge in physical education lessons. The domain of human motion analysis is and will be an important part in the training of future experts from this area.

Experienced teachers are interested especially in the basics knowledge about ICT. Because the fact they represent category of experts with minimal information in this domain, for them, are recommended training programs that assure the basic knowledge of ICT. The most interested in using graphics analysis software are the ones with 5 to 10 years teaching experience. The attitude of those teachers is determined by the fact they already have basic knowledge in using ICT, provided by the initial curriculum of training. With all these mentioned, applying the ICT knowledge in teaching physical education is reduced.

The future programs have to be designed on narrow interest area, that will be able to increase the competence level of specialists, concerned by a specific topic. We recommend that the continuous education programs related to ICT use in physical education and sport, to respect the training level of specialists and to stimulate their training level improvement. We consider that a

multi-level structure of educational offer could contribute to a high rate of knowledge applyance in physical education and sport.

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