COMPUTER USE IN PHYSICAL EDUCATION AND SPORTS TEACHING

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Abstract: Influenced by the technological, social and cultural changes, the educational domain faces a new dimension dominated by Lifelong Learning. For the physical education and sports specialists, this trend is also reflected by the necessity to improve their teaching methodology. A modern alternative is represented by the use of computers and of other information technologies meant to increase the teaching process effectiveness.

This paper aims at highlighting the ICT use positive influences upon physical education and sports. The gradual computerization outcomes in our domain can be summarized in the following aspects: educational software, activity designing and planning, result recording, motion examination, biomechanics video analysis, performance comparing and synchronizing, distance and time measurements and activity evaluation. Although physical education and sports are practical activities, they fully allow the application of modern teaching technologies, that’s why specialists must be able to use them.

Keywords: ICT in physical education, multimedia, activity planning.

I. INTRODUCTION

Information and communication technology represents more than a simple computer utilization, because it also compels us to use some measurement and evaluation electronic devices, some audio-visual aids for the subject’s and teacher’s performance evaluation or even some sequences allowing us to organize and objectively assess the final results.

The quick technological progresses have also been integrated into the physical education (PE) lesson to the point that nowadays they seem to threaten the rudimentary education tools.

The age of Information and Communication Technology (ICT) becomes more and more overwhelming, that is why we, as educators, need to change our conception about the way we teach. ICT helps PE pupils to learn by promoting and enhancing their work on the chosen directions and this may have positive effects upon their motivation and degree of involvement in the activity. At the same time, it helps them to decide on their learning style, which gives them more independence. Consequently, the traditionally acknowledged physical education lesson will have to adapt to this ‘paradigm shift’, by keeping to the teaching-learning process evolution [1], [2].

It is really difficult to conceive the possibility of joining physical education and ICT without losing our discipline essence, as both of them are very diverse and conflicting entities. A main concern should be related to the way of maintaining the level of participation in physical activities within an ICT environment lacking a ‘high psychomotor density’ [3].

The physical education teacher must consider this challenge as an ideal opportunity to raise PE learning to a higher platform. This paper aims at highlighting the ICT use positive influences upon physical education and sports.
II. TOPIC

Teaching will get new dimensions, as lessons will be greatly enhanced by the technology tools. The use of multimedia instructional tools will significantly enrich the teaching content that will become more dynamic and captivating [4].

With such facilities, teachers will be able to customize lessons according to their preferences, by using a selected text, sound, animation and video, in order to capture learners’ imagination. This is but one of the educator’s many exciting exploration tools he uses to redefine his teaching style. The education shape is changing, that’s why physical education will have to adapt its traditional teaching-learning pillars which are deeply rooted into the motor skill development.

2.1 Traditional PE lesson

Throughout the years, many schools of thinking have tried to define what physical education should entail. The concept of physical education has fluctuated, as “there have been so many different philosophical viewpoints that attempt to define what physical education really is; what physical education ought to be; what physical education ought to do; and how physical education ought to go about reaching its goals” [5].

Fundamentally, physical education aims at improving human performance and enhancing human development through selected physical activities meant to fulfill this outcome [2], [5], [6].

But apart from defining the physical education, it is important for us to study the teaching process, its content and results. By examining the subject’s pedagogy, we could get a deeper insight into the lesson content improvement and this would support us to develop and structure more effective programs.

Nowadays, the physical education instruction methods are deprived of the high technologies able to enhance teaching, probably except for a few isolated cases. The subject’s traditional teaching greatly relies on the use of institutionalized forms of sports devices as learning and instruction tools. Presently, the assisted-learning technology traces are revealed by the utilization of video and some other forms of visual aids.

Physical education is not merely concerned with the individual’s body aspect. With the subject’s and the profession progress, a greater and greater emphasis is put on the improvement of knowledge and attitudes favorable to lifelong learning and lifespan activity.

This shift from a “subject-centered curriculum” (mainly focused on the skill development) to a “people-centered curriculum” (mostly concerned with the ability and potential maximization through movement) represents a suitable stage for the ICT infusion into the physical education curriculum [6].

2.2 PE and ICT

Physical education and ICT are two entities so different that it is difficult to perceive them as being highly related or even synonymous within the educational sphere.

Recent technology advancements have introduced computers in many people’s life and education, as their price has gradually become affordable, their processing power has increased and their size has extremely diminished. All these innovations have really supported the fusion of physical education with information and communication technology [7].

The physical educator should use the ICT many advantages:
- It provides a wide range of programs assigned to enhance the physical education teaching.
- It provides an “avenue” for a variety of teaching styles. Enhance.
- It improves the lesson through a myriad of colorful graphics, diagrams, electronic texts, sounds, animations and movements.
- It keeps the learner focused on the issue.
- It allows a more efficient data storing and a quicker data analysis.
- It improves the lesson through the use of data loggers or sensors to collect information for the direct input and analysis.
- It contributes to the PE program comprehensive and efficient management.

ICT can also encourage pupils to learn by providing them opportunities to find out about and take part in PE-related activities, such as watching sports and dance in action. For example, ICT can help pupils to: develop and enhance their abilities to think in differently ways, which supports them to
select and apply skills, tactics and compositional ideas, but also to evaluate and improve their performances; collect, analyze and interpret data; take many roles and responsibilities related to physical education, sports and dance; access a variety of information sources, in order to improve their knowledge about physical education and its connections and applications to other learning areas; access a variety of information sources, in order to improve their knowledge about physical education in relation to anatomy, physiology, sports in society, health and well-being, skills and techniques specific to different activities; make them become more aware of the ICT impact upon our changing world.

It is important for us to remember that ICT is not a learning tool, but an environment that facilitates a pre-determined content teaching. That is why we should avoid lessons where pupils merely search for and retrieve information, with no prior learning outcomes settled by the teacher.

There are definitely much more ICT utilizations, but they are bordered by the human being’s imagination. Our present challenge is to depict how CD-ROMs, databases, spreadsheets, word processors, data loggers, digital imaging and other emerging technologies can be comprehensively entwined with physical education.

Biotechnological advancements and improvements of sports devices will also have an impact upon physical education, due to the fact that human motor abilities can be perfected and controlled.

Nowadays, it is uncommon to use computers on the playing fields or in gymasia. But as devices and computers become more and more mobile and affordable, this could eventually turn into a reality allowing the study of human movement within the physical education lesson, too. Education in the tomorrow digital ‘Information Age’ will see the life preparing learning evolve toward a lifelong learning continuum, where physical activity will have no time and space barriers.

As physical educators, we must cope with this wave of change and get adapted, otherwise we won’t be able to avoid our branch gradual extinction. ICT incorporates a huge collection of hardware and software. The following technologies should be used in physical education for planning, management and teaching purposes:

- Internet - a global network providing the capability to communicate, share ideas and access information and resources from around the globe.
- Intranet - similar to the Internet, but information is provided by a school or organization.
- CD-ROM - information takes form of graphics and text, being accompanied by sound and moving videos.
- Wristwatch/Heart rate monitors - usually, a strap fits around the chest and contains a radio to transmit the heartbeat to the monitor in the wristwatch.
- Digital camera - the taken pictures are stored in the computer memory rather than on a film, as in the case of an ordinary camera. They can be displayed directly onto the computer monitor or imported into a graphics/art package for editing.
- Generic software - the most common forms are word processors and spreadsheets.
- Video capture - a video camera that can be connected to the computer. Video sequences or still images can be stored on the disk and edited.
- Data handling - information can be stored in a database.
- Desktop publishing - a combination of text, graphics and layout, to produce a document.
- Presentation software - for example, Microsoft PowerPoint, a software displaying information under the slide form.

The use of audio-visual aids in physical education lessons represents a modern system contributing to the physical exercise quick learning. At the same time, they facilitate the increase of pupils’ interest in working individually with these devices, for they understand how to correctly perform movements: errors are corrected, their intuition is improved and their training is stimulated [8], [9].

While performing, the pupil or the athlete can’t survey his own execution, the necessary corrections relying on the coach’s observations or on the obtained result analysis. Therefore, there was a need to use some means allowing an objective analysis of the performed technical executions.

Thus, by taking into consideration the skill forming stage and pupils’ particularities, the audio-visual aids provide an intuitive knowledge through the visual analyzer. When learning new technical procedures, some photostatic aids, such photos, slides, but particularly kinograms and photo-diagrams,
prove to be very useful, the last ones allowing a minute analysis of the movement different phases in their chronological progress.

But these aids mustn’t be considered a goal in itself. They don’t exclude the classical teaching aids, methods and procedures, but represent auxiliary means, accompanying the traditional ones improved in their turn, for the lesson maximum efficiency.

The digital camera use in the instructive-educative process allows a quick verification of pupils’ placement and posture, being at the same time a very good means to stress the body segment positions when performing some motor elements.

Among the aimed objectives when using this device in physical education lessons, we can mention the following:

- pupils’ immediate image of their own motor performance, which helps them to correct the errors identified after the digital photo analysis;
- pupils’ stimulation to analyze their own performances;
- the effective work time increase, by encouraging pupils to repeat executions;
- valorization of the successful executions similar to the image: “Good!”

When using images, the teacher’s advantage consists in his possibility of making corrections as soon as the pupil’s exercise is completed, which helps him to quickly progress and improves his learning. At the same time, pupils’ supplied effort is relocated in the next lesson, which favors a very good pedagogic continuity. The teacher also has another advantage, namely he can use photos to create some worksheets meant to improve pupils’ subsequent progress.

From the pupils’ standpoint, a first advantage is to immediately observe their own performance. Thus, each one develops a critical view on his performance and the advice taken immediately after the visualization facilitates the error correction.

The valorization of pupils’ effort while performing is achieved by electronically saving the taken photos and by analyzing them within a group or the whole class of pupils. From the above-mentioned aspects, we can detach the three plus-value main directions generated by the photo utilization: plus-value for the pupil, for the teacher and for the pupil-teacher couple.

### TABLE 1. Plus-value generated by the utilization of photo aids in physical education and sports

<table>
<thead>
<tr>
<th>Pupil</th>
<th>Teacher</th>
<th>Pupil-teacher couple</th>
</tr>
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<tbody>
<tr>
<td>- actor of his own motor progress</td>
<td>- teaching is facilitated</td>
<td>- evaluation is differently approached</td>
</tr>
<tr>
<td>- exercise understanding is facilitated</td>
<td>- all the available resources are used</td>
<td>- pedagogic exchanges between teacher and pupil are facilitated</td>
</tr>
<tr>
<td>- problem visualization is simplified</td>
<td>- material resources multiply</td>
<td>- pedagogic continuity from one lesson to another is facilitated</td>
</tr>
<tr>
<td>- critical thinking enhances</td>
<td>- pedagogical reactivity increases</td>
<td></td>
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<tr>
<td>- motivation increases</td>
<td></td>
<td></td>
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<tr>
<td>- autonomy is facilitated</td>
<td></td>
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</tr>
<tr>
<td>- self-evaluation capacity improves</td>
<td></td>
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<tr>
<td>- evaluation is differently approached</td>
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<tr>
<td>- results are immediately known</td>
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</table>

But there are sports activities which, through their form and content, can’t be studied, analyzed and assimilated by pupils/athletes, because of the exercise or the action quick progress pace (gymnastics, athletic events - throwing, jumping). In these situations, video projection is particularly efficient.

Films present the real movement, decomposed or in slow-forward mode, as well as the recorded subject repeated replay, by creating thus the possibility to directly notice and deeply understand some minutely detailed elements that might be ignored even by an experienced observer.

The utilization of video techniques through which pupils can survey their own performances facilitates a quick error correction. At the same time, these aids allow each pupil’s performance evaluation relying on the records. Thus, placed in front of a monitor or a screen, the pupil, under the teacher’s guidance, can evaluate his own motor performance.

Together with the devices specific to physical education and sports, the aids necessary to carry out this filming activity on the playing field are the following: computer; video camera or webcam;
specialized software: Kinovea, Dartfish; connection cable between video camera and computer; video camera tripod; computer desk.

A very attractive multimedia tool determining pupils’ enthusiastic participation in physical education lessons is represented by the audio aids.

A particular focus is placed on the pure direct or indirect aids, such as drum, piano, respectively radio cassette recorder equipped with a CD/DVD, all these being used to refine the movement pace and get pupils familiarized with some sonorous competitive conditions.

For performance athletes, the above-mentioned multimedia resource represents a relaxation means before their participation in competitions or perhaps a stimulating element. On the other hand, there are sports, such as skating and gymnastics (certain artistic and rhythmic events), where music is an integrant part of athlete’s performance.

In physical education, the musical background is recommended in different lesson sequences, as a support to pupils’ enthusiastic involvement in the activities or even as a motor learning facilitator. The simplest example is the musical background using in the sequence destined to the locomotor apparatus selective influencing. Another example refers to the utilization of mp3 players while pupils perform the athletic endurance running event [6].

This audio tool using involves the following aspects: musical sequences corresponding to the contest type and to pupils’ learning stage or training level; insertion of some sonorous beep signals while music is playing, for the intensity adjustment; insertion of some advice, in order to facilitate the intensity maintaining.

This tool utilization activates motivation and keeps it during the effort. The musical background is an energy activator and facilitates autonomy.

Another important direction is represented by the use of different software for the movement analysis, for example Kinovea or Dartfish [9], [10].

Kinovea is a video analysis software for sports, mostly assigned to physical education teachers, coaches, athletes and physical therapists. Kinovea can also be used to study ergonomics and 2D/ 3D animation. Its current available variants allow the display of video files such as AVI, MPG, MOV, WMV, MP4, MKV, VOB, 3GP. Some advantages of this program utilization are: observation, measurement, comparison or editing video files specific to physical education and sports field.

As for a video file observation, this software allows its users to perform the following actions: to wind a video file; to observe movements; to observe mirrored images; to adjust image quality; to use some analysis grids; to unwind a video file; to add comments or drawings on the key-images.

The measurement process involves the following actions: to watch some objects or points relevant for teachers and pupils; to keep the time; to measure distances; to measure speed; to shift the obtained information to Microsoft Excel application.

The comparison of video files aims at synchronizing and simultaneously watching two films, while editing presumes to save some film images or successions of images and to analyze them. If coaches use the computer to make selections, to prepare competitions or to program the training sessions, the physical education teacher uses it to draw up the planning documents.

Planning is one of the most important aspects in physical education teacher’s activity. It generates the planning documents which provide the scientific substantiation of school physical education teaching process: the yearly thematic plan, the semester calendar plan and the instruction unit design. When drawing up the planning documents, physical education teachers should use the Office pack components.

III. CONCLUSIONS

The physical education essentials require the physical activity performing. Most physical educators associate subjects to the development of motor skills. The physical education position within the schooling system is already struggling for a valuable curriculum time.

Nowadays, there is a fear that motor density could be compromised by the ICT introduction into the lesson. That’s why it is important for us to carefully think about the ICT role in the physical education lesson, by keeping in mind that it can’t replace the actual physical experience.
However, as educators, we can’t ignore the modern technology tremendous impact and influence. The utilization of interactive learning tools in an entertaining environment is a much debated topic, because of the perception that entertainment and education can’t go together.

This educational process derives from the norm stipulating that learning should better occur in a play and enjoyment atmosphere, which is somehow specific to the physical education lesson. But there is a danger, because it is very easy to fall into the trap of merely using the current available tools, even if they are not specific to the physical education requirements. Therefore, such self-paced learning environments need to be properly directed. This reflection must be taken into account when purchasing software for the school physical education programs, since the market is saturated with companies trying to sell their products, by claiming that they are effective educational software tools.

When technology fails to deliver the expected product, ICT becomes susceptible to be rejected. By attempting to merge ICT and physical education, we often find out that ‘technology is frustrating’. It is really disruptive to teach when a lesson is interrupted by a power failure or when software and servers don’t respond as expected. Such problems are very real and inevitable.

There are nowadays many available technological innovations that could be inserted into the physical education lesson. The ‘virtual’ physical education lesson is widely based on the ‘connected learning’ environment which also uses other technology forms, but all of them within this networked structure.

References

[10] www.kinovea.org