INNOVATIVE TECHNOLOGIES IN THE WORK OF A TEACHER OF PHYSICAL CULTURE AND SPORTS

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Abstract: The article represents an attempt to investigate modern theoretical provisions and best practices in the field of introduction of innovative technologies into the work of physical culture and sports teachers. Both didactical and technological aspects are considered based, in particular, on some case studies and empirical research. The importance and expediency of AR/VR technologies in teaching physical culture and sports are emphasized, as well as the relevance to addressing some elements of professional sports training practice.

Keywords: innovative teaching technologies; innovative approach; physical culture; sports; virtual reality.

1 Introduction

In today world, it is difficult to deny the importance of introducing innovative technologies into various spheres of science, culture and education; many scientists adhere to the same position. The thesis about the positive impact of introducing various innovations into physical education practice that have already shown their effectiveness runs like a red thread through many scientific articles devoted to advanced methods in physical education.

Every physical education lesson, whether at school, university, or in other educational institutions, sets one of its primary objectives to strengthen and maintain the health of students. Health-saving educational technologies can be called the most significant among all other types of technologies. In addition, when playing sports using the latest and improved methods, the risk of many diseases is reduced.

For example, about 45% of modern schoolchildren notice symptoms of physical inactivity. Possible consequences of physical inactivity are an increased risk of deterioration in the functioning of the musculoskeletal, digestive and nervous systems, a 40% increase in the risk of premature death within 15 years of work associated with long (more than 6 hours per day without preventive breaks every hour of work) sitting in front of a computer monitor, the occurrence of pulmonary embolism, circulatory disorders in the pelvic organs, etc. [7]. The reasons for physical inactivity, in addition to such large-scale and well-known one as scientific and technical progress, thanks to which the emergence of the global Internet took place, and as a consequence, the involvement of a large percentage of people in the so-called "network life" or the development of communication systems, is urgent addiction (lack of time), the problem of procrastination (a condition characterized by constantly postponing important things until later), the presence of depression (depression as a long-term depressed mental state has a "fettering" effect on the individual, which in most cases prevents his physical activity), low level of stress resistance. Advanced methods in the field of physical education can not only prevent the development of physical inactivity in the early stages of its occurrence, but also reduce the manifestations of existing symptoms.

In addition, innovative technologies in teaching physical education and sports help to reveal the multifaceted abilities of students. Often people themselves do not know what they are really capable of. Physical education classes can help students realize their potential in various physical disciplines, which, with the right approach, will allow them to successfully participate in competitions.

At the same time, the innovative activity of teachers can be considered as one of the parts of innovation in various types of its manifestation, such as the development of innovative methods, organization, management, selection and implementation of original means. When choosing an innovative approach, a teacher must first of all rely on creating conditions for the development of the creative potential of each student and on the requirements of educational standards. The use of the very term "innovative" in methodological publications and scientific articles characterizes the innovative processes occurring in physical culture.

Today, specialists are required to have new ideas in teaching culture and sports. Effective implementation of an integrated approach to physical education of students into the educational process involves the use of innovative pedagogical technologies based on the best experience of not only university pedagogy, but also the pedagogy of professional sports, as well as an interdisciplinary approach and the use of the latest digital technologies.

2 Materials and Methods

The methodological basis of the research is the theory of functional systems, the theory of pedagogical management, the concept of activity physiology, the concept of individual self-realization in the process of sports activity, as well as general scientific and special theoretical and methodological provisions of the sports training system.

The study also used the main provisions of the systems approach, pedagogical theories of problem-based, contextual and collective learning, university didactics, theory and methods of physical education and private methods.

3 Results and Discussion

Different types of lessons, forms of their implementation, the integrated use of frontal, group, individual forms of work, the use of various methods and techniques of teaching, including non-standard lessons - lesson-games, lessons-contests, lessons-competitions - all this allows stimulating students' interest in physical education not only in the classroom, but also in their free time.

Information and communication technologies make it possible to organize the educational process at a new, higher level. These technologies help solve another problem - to interest students in obtaining information about the formation of a healthy lifestyle, the history of the development of physical education and sports.

Physical education lessons include a large amount of theoretical material, for which a minimum number of hours is allocated, and the use of ICT allows to effectively solve this problem through explanations of the technique of performing training movements, historical documents and events, biographies of athletes, covering theoretical issues.

Moreover, the use of interdisciplinary connections not only helps to create a holistic picture of the world, but also contributes to the development of an aesthetic attitude towards sport as an art, cultivating, in particular, a sense of patriotism [3].

The teacher's task is to choose teaching methods that would allow each student to show own activity, creative abilities, and to intensify the student's motor and cognitive activity. The use of new information technologies and Internet resources allows one to achieve maximum results in physical education lessons.

The main task is to attract every student to study their body, to understand the potential inherent in it. A physical education

teacher must help students to discover their potential. Group learning technologies help optimize the learning process – it implies the use of small groups (3-7 people) in the educational process. The main condition for group work is that direct interaction between students is carried out on a partnership basis. This creates comfortable communication conditions for everyone and ensures mutual understanding between group members. Possessing a fairly powerful motivating force, group learning technologies can optimize the learning process, making it more effective. In particular, the use of group technologies when teaching the "Sports Games" section of curricula makes it possible to increase the 'motor density' of lessons and activates the cognitive activity of students [27].

The following sports can be used as non-traditional innovative methods of conducting classes:

1. Yoga. The practice of this system includes physical relaxation techniques and muscle tension techniques that are based on concepts such as relaxation, stretching, increased circulation, deep breathing and concentration. The asanas that make up yoga help improve physical strength and flexibility and have a relaxing effect. Yoga can be combined with other physical exercises and is applicable even for students with some disabilities.
2. Nordic walking. It is a highly effective type of physical activity that involves the use of a specific walking technique and exercise technique using special sticks. It engages and develops about 90% of all muscle groups, maintains muscle tone in the body, reduces pressure on the spine and joints, promotes the dynamic functioning of the lungs and heart, improves the sense of balance and is a good method for correcting posture. A separate advantage of Nordic walking is the ability to practice it anywhere and at any level of physical fitness.
3. Stretching exercises. Their basis is static stretching of muscles and joint-ligamentous apparatus, which helps prevent and correct postural disorders. Stretching helps increase joint mobility, muscle elasticity and improve blood circulation [9].
4. Step aerobics. It is a type of aerobics in which the movements performed on the stepper are performed through maximum tension of the leg muscles, rather than the back muscles. Regular exercises in the form of dance movements help prevent arthritis and osteoporosis, recover from knee-joint injuries and improve mental well-being.
5. Pilates. It includes a series of exercises that help increase flexibility, restore physical fitness, improve posture, develop and strengthen muscles and improve coordination.

The use of a variety of innovative methods of physical education contributes to a significant improvement in the physical fitness and health status of students, and also increases their level of motivation for physical education [22; 23].

Innovative technologies in physical education and sports offer a wide range of tools and applications that help improve the training process, analyze data and increase the effectiveness of training. Here are some examples of such technologies [8]:

1. Portable devices for monitoring physical activity. These can be fitness trackers, smart watches or specialized sensors that can track the number of steps, distance traveled, heart rate, calories, activity level, and other parameters. These devices help students and athletes monitor their physical activity and improve their performance.
2. Virtual reality and augmented reality. These technologies enable the creation of immersive training environments in which students and athletes can simulate different situations and training conditions. For example, they can train on virtual tracks or ranges, compete against virtual opponents, or receive feedback on their technique.
3. Analysis of movements and biomechanics. Using special cameras, sensors and software, it is possible to analyze the movements of students and athletes, evaluate their technique of performing exercises and identify errors or shortcomings. This allows coaches and teachers to give more accurate recommendations and adjust technique to achieve better results.
4. Interactive simulators and gaming platforms. These can be special exercise equipment or gaming platforms that combine physical activity with gameplay. For example, students and athletes can train on exercise bikes, where they compete with virtual opponents or go through various game tasks, which makes the training more interesting and motivating.

These are just some examples of innovative technologies in physical education and sports. Every year, new developments and opportunities appear that help improve the training process and achieve better results. Thus, continuous tracking of new developments and systematization of best practices are of crucial importance.

Modern pedagogical science and practice includes a fairly wide range of educational technologies. The most important components of new educational technologies are personality-oriented ways of interaction between a teacher and a student. So, as an example, let us consider educational technology based on the personal orientation of the pedagogical process. It provides for a pedagogy of cooperation, a humane-personal approach, as well as technologies for the formation of personality based on the activation and intensification of the activities of those involved. Much attention is paid to problem-based and communicative learning.

Also, experts highlight a direction related to pedagogical technologies based on effective management and organization of the educational process. The main components of this direction are technologies for individualization of training, cultural-educational technology of training according to the interests of students, promising advanced technology of training using support schemes with commented control, technology of software training and computer technologies.

The next direction is pedagogical technology based on didactic improvement and reconstruction of the educational process. The technology of self-developing learning is interesting because it includes such important areas as self-education, self-affirmation, self-expression, self-determination and self-actualization in achieving personal and social goals and adaptation in society.

One of the best means of expressing all these pedagogical technologies in the educational process of physical education of students is, in our opinion, the system of creating sports sections in universities according to the interests and preferences of students.

It should also be noted that various types of fitness practice in the physical culture and health activities of students are most popular, they are distinguished by accessibility and a positive emotional background in their implementation, as well as a wide variety of means and methods. Fitness technologies have huge potential for diverse and effective effects on the body of those involved, which makes them attractive to students.

Fitness technologies are a set of physical exercises, dance elements, steps, techniques, grouped into a certain algorithm of actions, implemented in a certain way in the interests of increasing the efficiency of the health process, ensuring guaranteed achievement of results, based on a free motivated choice of classes using innovative means, methods, organizational forms, modern inventory and equipment [24].

Many authors note that when elements of fitness technologies are introduced into habitual physical education classes, students' interest raises and attendance at physical education classes increases [9]. It is possible to introduce fitness technologies at a university as follows:

1) During the educational process of physical education of university students;
2) In elective classes that are a continuation and addition to the training sessions included in the curriculum;

3) Within extracurricular time in the form of classes during the day, in sports sections and general physical training groups;
4) As a form of independent work at home, fitness centers, gyms, sports complexes.

As practice shows, the greatest interest arises, subsequently develops and consolidates during the educational process, in physical education classes, and later develops into independent work [20; 24; 25; 30].

With regular fitness classes, coordination abilities and abilities of the musculoskeletal system develop, the respiratory and cardiovascular systems develop, growth indicators improve, weight is controlled and maintained, and posture improves. Fitness has a positive effect on the condition of the body as a whole, and it does not require much effort. Therefore, the introduction of fitness primarily increases the student's preparedness for future work. Also, these classes help to increase the student's interest in regular sports activities, because it is exciting forms of physical education that can enhance the emotional component, general and motor density of the lesson, as a result increasing the efficiency of the learning process [3].

The challenges of modern education are: the concept of continuous development; unlimited access to information for students; clip thinking. At the same time, today learning is built around the student, not around the material. It is not enough to simply present new material - it is important to integrate it into the student's existing body of knowledge. This is only possible in interactive formats. After all, when making a mistake, a student becomes aware of "ignorance", which motivates him to search for new information, the value of which becomes obvious to him. This forces him to actively participate in the educational process. At the same time, the challenges of today's physical education are physical inactivity and poor motivation.

Over the past few years, in overall, classrooms have undergone significant changes. Workbooks, handouts and PowerPoint are a thing of the past. They have been replaced by gadgets and advanced educational technology tools. Although all these things have changed in the classroom, physical education has largely remained the same, so often physical education classes are unattractive to both schoolchildren and students, and they try to avoid taking these classes.

It is logical that University 3.0 should have methods of teaching physical education and sports that correspond to this paradigm, in particular those based on the use of virtual and augmented reality.

Specifically, the benefits of VR include the following [5]:

1. Involvement: due to the effect of presence. VR transforms the educational process, making it significantly more interesting.
2. Immersion: a person finds himself in a three-dimensional space and interacts with believable avatars and objects, and not with flat photographs on the screen.
3. Focusing: VR provides complete isolation from external stimuli, as well as the ability for the teacher to control the student's focus.

   In addition to watching sports through virtual reality, viewers can become athletes themselves by immersing themselves in the virtual reality sports arena. Virtual technology has made sports games more immersive. Earlier,, Nintendo's Wii allowed gamers to play tennis in their living rooms. Now VR can create a much better experience that is more fun and interactive. Oculus Rift, HTC Vive and PlayStation VR have created virtual gaming platforms. VR Sports Challenge and BoxVR are representative examples of VR sports games.

4. Training of athletes and sports teams. Most available VR learning environments are designed to facilitate cognitive learning.

Virtual reality can create significant benefits for training from both an athlete's and a coach's perspective. The key to modern athlete training technique is to capture and understand the player's movements as fully as possible. VR technology allows coaches to observe their team members from different angles to better understand behavior, while athletes can also observe their performances in real matches and training [2]. At the request of the coaching staff, a certain situation on the virtual field is simulated to analyze game behavior. The user must make the right choice: where to run, for example, help in achieving the goal, and so on. If the player sees over and over again what is around him, how he stood, what the mistake looked like, then in the future he will be able to make better decisions.

CoPeFoot, for example, is designed to help players learn and practice tactical decisions in soccer. CoPeFoot uses context-based reasoning as a learning platform in which player-activated avatars perceive, decide, and react to various situations on the football field. Avatars in CoPeFoot were designed to simulate the decision-making process of star players in a real-life setting. In the CoPeFoot system, whenever the avatars are faced with a tactical problem, the player will act and interact with them to find an appropriate solution. This decision then becomes the one which the enemy avatars will use against the player in training in the future. When the player makes a move that creates a similar tactical problem, the opponent's avatar reacts to it with a counter-decision, which creates a new tactical problem for the player.

VR provides many opportunities for safe training, especially in contact sports such as football.

Heart rate, respiratory rate and sweating are important physiological indicators of the effect of physical activity on the human body. They are also often used as indicators of whether a person is exercising. Standards based on these indicators, especially heart rate, are used as platforms on which the effects of physical activity are assessed for both adults and children. In recent years, VR technology has been seen as an opportunity to study and improve physiological responses to exercise in a safe, controlled and motivating environment. Research shows the positive impact of using VR on participants' task commitment and performance, since while performing physical activity, it is difficult for trainees to know their energy levels in real time, and virtual reality provides them with information about their behavior and physiological reactions [4].

Using a virtual image in the mirror, users can visually monitor themselves and check how they are performing exercises. To generate an image in a virtual mirror, the participant's appearance is scanned in advance in 3D and transferred to an artificial figure, an avatar. In a virtual mirror, the user does not just see himself from the front. The mirror can be rotated on demand to see the other side of oneself, allowing the user to better judge whether the exercise is being performed correctly.

With the help of virtual technologies, one can visualize things that are usually impossible to see. The system can provide the user with visual training cues, such as highlighting specific body parts with color in a mirror. For example, when the user lowers during a squat, the thighs on his avatar turn red until they move to the correct end position. The system also points out mistakes: Some mistakes made during movement exercises, such as bending the neck too much during a squat, are exaggerated in the mirror to draw attention to the mistake. Users can also see a demonstration of the exercise: an additional translucent figure is superimposed on the user's avatar in the mirror and performs the exercise along with the corresponding user. The user can then simply follow the movements performed by this second figure, which allows him to know the correct sequence of movements.

Thus, the traditional method of teaching through a teacher is complemented by the acquisition of knowledge and skills through the interaction of students with the information environment, and learning becomes individual. Virtual reality in physical education lessons can not only save learning time, but also give direct and real results. Students are trained to enhance

their capacity for self-learning and innovation, unlocking their potential by avoiding accidents while practicing and overcoming time and place constraints. The use of virtual reality technology in physical education turns lessons into fun so that learning becomes more comprehensive.

Liang et al. [19] examined the impact of augmented reality in physical sustainable education on learning behavior and motivation. The authors developed a strategy exhibiting AR education material functionalities interface mapping incentive to enhance skills and skill acquisition (see Figure 1). The results of this study are as follows: First, the experimental group (using AR) outperformed the control group in terms of motor skill acquisition. The experimental group also has greater learning motives and performs better in motor skill tests than the control group. Finally, the experimental group has a more favorable attitude regarding using the educational materials, and they find the materials more acceptable than the control group.
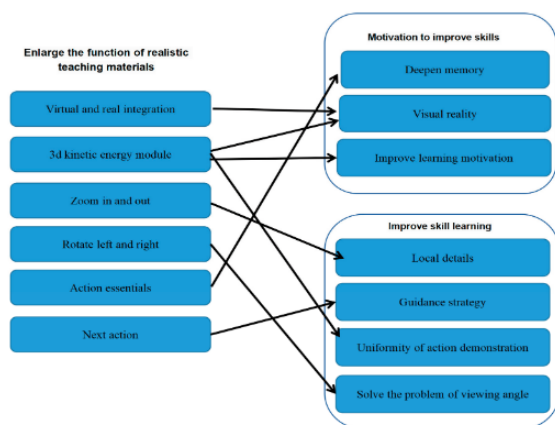

Figure 1. AR teaching material functions interface mapping motivation to improve skills and skill learning [19]

With the fast growth of artificial intelligence technology, it is now possible to integrate information technology, databases, and multimedia equipment to create an educational environment that blends technology and education. Teachers may use design and processing to present students with mini courses that incorporate graphics and words, making the instructional content more intuitive and vivid. This not only increases the pupils' excitement for learning, but it also broadens their comprehension of sports expertise. In addition, professors can create a group discussion concerning micro courses for students to join. Before and after class, they may upload the prepared AI teaching courseware to the group chat for students to see and consolidate. If they don't comprehend anything, they can write it down. The instructor would reply quickly when they saw it, which improves the connection between teachers and pupils [29]. Yu and Mi provide IoT and AI applications for creative college sports practices. As shown in Figure 2, the teaching system collects data from sports teaching activities in real time using IoT, sensors, and wireless networks before transmitting it to the data center, where it is loaded into an intelligent computer for processing and analysis. Finally, teachers plan teaching activities based on the outcomes.
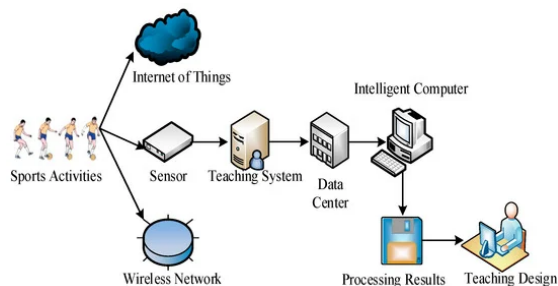

Figure 2. Overall architecture of teaching system based on IoT and AI [29]

Furthermore, physical education teachers might implement the sports game teaching style. The sports game approach refers to teachers combining reasonably attractive and competitive games with the sports training process in order to maximize sports teaching and training modes. Sports games may successfully alleviate the dullness and monotony in the training process, and play essential roles in capturing students' attention [28]. Aside from that, it allows students to acquire and perfect certain sports abilities while participating, which can help them reach their training objectives. Training via sports activities may not only increase students' interest in learning, but it can also create a more lively teaching atmosphere, making it easier to guide students through sports events on their own. When planning sports events, physical education teachers must keep in mind that the relevant training goals should, to some extent, be met by students or their teams. This necessitates students continually improving their athletic abilities and focusing on the training objectives they may reach in order to entice students to engage in sporting events. Students' psychological and physical well-being can be changed by involvement in sports games, allowing them to participate fully in the lesson.

College sports are an immensely essential part of student life at American campuses, whether it's watching the university's team face a rival college team or participating on a team with friends. It provides a social experience for both fans and collegiate athletes. Most American universities split sports into three categories: intramural, club, and varsity or "NCAA" sports (National Collegiate Athletic Association). Intramural sports allow students of all athletic abilities to compete against friends and classmates from the same college. Club sports are typically significantly more competitive. A student who wishes to participate in a club sports team must often try out and be chosen by the club's captain. Varsity level or "NCAA" sports are similar to many professional teams in that great athletes are recruited by colleges to participate on their top teams.

Many students at universities around the United States join intramural sports teams to meet and engage new friends while also staying physically active. Many of these teams are "co-ed", which means that both men and women compete on the same squad, but there are also distinct men's and women's teams. The most popular intramural sports include volleyball, soccer, softball, dodgeball, football, kickball, and basketball. Every season, each sport's teams compete in a tournament against other teams from the same institution. The teams with the best record in each sport at the end of the season frequently get a trophy.

Club sports are typically more competitive than intramural sports. Most club sports teams need students who want to participate competitively to attend a tryout held by the club team leaders. If a kid makes the squad, he must attend mandatory practices to secure his spot in the club. Club teams from various colleges compete against one another in competitions and matches. Although this may be true for most club sports, not all are competitive. Many club sports merely allow students to study sports that they were not exposed to when they were younger. Martial arts clubs are among the fastest growing at major colleges, owing to the rising popularity of mixed martial arts events throughout the world.

Varsity sports are for the most gifted athletes in a specific sport. A major number of these athletes were recruited from their high school to play for a university's team, although some tried out for a spot on the squad. Varsity sport competitors, unlike professional athletes, are not paid to compete, but many do get scholarships. A chosen few athletes who excel in collegiate sports will be drafted by a professional club. For the remaining athletes who are unlikely to pursue a professional career, participating in a varsity sport provides them with the opportunity to compete for a title. These contestants desire to win not just for personal glory, but also for the honor and reputation of their alma institution.

American football is the most popular varsity sport for students to watch. Every fall, students dress in their university colors and

travel to stadiums to watch their football teams compete against other education institutions in their conference. Students spend entire Saturdays preparing for the game. Extremely ardent supporters will dress up in crazy costumes or shave their heads in the style of the university insignia to show their support for their team.

All of these elements make college athletics essential for surviving life as an American college student. It allows students to escape the demands of class, unwind after a hard week, and just make new friends.

Effective implementation of innovative educational technologies in physical education lessons is impossible without a sufficient level of development of the following criteria for the pedagogical preparedness of a physical education and sports teacher [1; 6; 10-17; 21; 26]:

1. Coaching. It consists of the ability to demonstrate motor stability and variability of the technique of the chosen sport and perform motor exercises of an increased level of complexity.
2. Reflective pedagogical. It consists of the ability to study and analyze best practices in the field of physical education and effectively solve current pedagogical problems within educational institutions.
3. Recreational and creative. It is a skill in the creative organization of recreational work, taking into account the age, gender, and individual personal characteristics of students.

Successful implementation of innovative methods in physical education classes is impossible without increasing the level of professional competencies of a physical education teacher, which requires the use of appropriate innovative technologies. This makes it important to use innovative methods at all levels of education.

Increasing the scale of innovative activities in educational institutions, involving more students in classes using the latest technologies, creating a favorable infrastructure in places designated for the experimental use of innovative methods and technologies of health, humanistic education and organizing leisure time for students, which involves the humanization of sports and its combination with art, contribute to the formation of students' research skills during independent sports and recreational work in physical education classes and increase the quality and effectiveness of physical education.

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Primary Paper Section: A

Secondary Paper Section: AM