

# INTEGRATION OF COMPREHENSIVE AND INNOVATIVE APPROACH IN TEACHING STUDENTS-SPORTSMEN

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## ABSTRACT

*This article deals with the author's vision of teaching students-athletes the discipline "Natural-science foundations of physical culture and sports: Physics" (hereinafter, physics) based on the integration of module, personal-activity, competence, historical, concentrated, problematic approaches. The modular approach involves division of educational material into thematic units (modules), and the result of their study is assessed according to the score-rating system of students' knowledge evaluation. Self-educational skills of work with information resources generated with the students during the study of computer science, allow them to independently develop other disciplines using distance education resources and technologies in a virtual educational environment of higher school of physical education. As a result, each student-athlete receives equal educational opportunities. Personal-activity approach defines student-athlete as a subject of activity. Each student-athlete realizes his individual educational trajectory, which includes a variety of activities: educational and cognitive, social and communicative, training and competitive. The principles of competence approach allow us to determine the meaning and content of education, sense of organization of educational process, assessment of the educational results of student-athletes. Using the historical approach is reflected in the structure of the presentation of the material being studied, where sufficient attention is paid to the evolution not only of the studied laws of physics, but also to sporting achievements. Problematic approach in our study allows us to pose the problematic tasks: to explain the sports phenomena from the point of view of the laws of physics. Integration of the above mentioned approaches have determined the structure of the material partition in the blocks: "historical block", "Block of knowledge actualization", "Theoretical block", etc. Such an unusual approach to the study of discipline will contribute to a better understanding of natural science picture of the world, the formation of the ability of students-athletes to use and transform the laws of natural sciences disciplines in the field of sports and physical culture.*

**Keywords:** *complex training, modular approach, personal-activity approach, competence approach, concentrated approach.*

## INTRODUCTION

In the practice of teaching activities methods of complex use of modern learning approaches are becoming increasingly popular. They combine modular, personal-activity,

problematic, competence, historical and concentrated approaches. Each of them deserves special attention and is of equal importance in the preparation of educational process.

## METHODS

According to the *modular approach* learning information should be provided in blocks (modules), the result of the study of which is estimated by the rating system of assessment. Communication between the trainee and learning one happens through modules and private individual communication, while the student works independently as much as possible, learning self-organization and self-planning. Let us consider the interpretation of the main provisions of the modular approach to teach discipline "Physics" in FGBOU VO «Volga Region State Academy of Physical Culture, Sports and Tourism" (hereinafter Academy) to students-athletes.

All course material is divided into blocks (modules), while the partition is not only in the complexity of the studied material (initial, basic and advanced levels), but also in thematic blocks, "Problem setting", "Historical block", "Block of actualization of knowledge" "Theoretical block", "Self-control block", "Expansion and deepening of knowledge block", "Independent work block", "Literature". All learning material is distributed in two training modules and posted on the remote learning platform *Moodle*, which is one of the main tools of the virtual educational environment of higher school. Assessment of learning results takes place according to the "Regulations on the score-rating assessment of students' knowledge", introduced in the Academy. The scores obtained by students, are recorded in an electronic log IC.

Students-athletes are forced, in connection with the preparation and participation in competitions, to be geographically separated from the teacher and the school most of the time. Therefore, self-organization, self-education plays an important role for them to be able to simultaneously carry out various activities: training and competitive, educational and cognitive, social and communicative, all of which is an individual educational trajectory of a student-athlete. This is facilitated by self-education skills to work with information resources generated by them during the study of discipline "Computer science", and later used by them in the study of other disciplines, such as physics. These skills allow at any convenient time student-athletes, anywhere to learn the discipline to give methodological assistance of the teacher, the technical support of IT staff, administrative management. Thus, thanks to the capabilities of Moodle environment and self abilities and skills to work with information resources formed by the students, it is possible to chat communication between all the actors of the educational process in high school physical education.

On the basis of *personal-activity approach* a person is treated as the subject of activity, which in itself, being formed in the activities and to communicate with others, determines the nature of the activity and communication. It is necessary to take into account the interests of students, each of them - personality, creative personality. Education - is an interaction, communication (problem) tasks solution .

Indeed, the identity of each student-athlete is unique, not similar to others, and we can only conditionally divide them into groups, depending on the form of their education, training intensity of competitive activity, psychological, physiological, age and other characteristics. So according to the intensity of the training-competitive activities athletes-students are taught either full-time or full-time with an individual plan of study or by correspondence. The virtual educational environment of higher school is focused on the development and self-development

of students-athletes, providing them with equal educational opportunities - access to quality education. Thus, each student-athlete is able to realize themselves in learning and cognitive activity according to their abilities, interests, aptitudes, training and competitive activity intensity and form of education.

The virtual learning environment allows you to simulate a variety of educational situations that require individual, personal approach and solution of problematic tasks contribute to the development of students' thinking, the formation of their ability to transform the laws of natural sciences in the field of physical culture and sports.

At the core of *problematic learning* are the ideas of the American psychologist, philosopher and educator John Dewey, who laid the learning foundation not the curriculum, but the games and work. Scheme of problematic learning involves a sequence of specific procedures: setting educational and problematic task, the creation of the problem situation, understanding and solution of the problem, which resulted in the learners master the generalized methods of acquiring new knowledge and in the future the ability to apply them to solve specific systems of problems.

Each topic is studied with formulation of the problem: a vivid example from the world of sports is taken, it creates a problem situation, which is proposed to be solved by the students on the basis of previous knowledge of school physics course or own sports experience. With some problematic challenges the students cope on their own, but most problematic situations require new theoretical knowledge, which they receive in the study of the "theoretical block."

According to research in the field of *competence approach*: competency is a requirement of the educational training of students, and competence is a mature personal quality (or a number of qualities) and minimal experience in relation to the activities in this area. Based on the experience of researchers in the field of this approach, as well as on our own observations, we denote its main provisions from the perspective of educational process in higher school of physical education, in general, and in the student-athlete's training of the discipline "Physics", in particular.

Educational process in higher school of physical training is aimed at the formation of the general and professional competences. The virtual educational environment of higher school allows you to create the following main *core competencies* of a student-athlete:

- *Educational and cognitive*: skills of planning, organization and implementation of teaching and learning process in accordance with the training-competitive activities;
- *Informational*: Self-educational skills to work with information resources;
- *Communicational*: skills of active communicative interaction with all subjects of the educational process in higher school physical education.

Based on the principles of competence-based approach:

- Sense of *education* is to develop in a athlete-student some abilities to make independent decisions in different areas of his activities (teaching and learning, training and competition, social and communicative) through the use of the previous social, including their own experience;
- Content of education is expressed in didactically adapted to the student-athlete social experience of solving learning and cognitive, ideological, social and other problems;
- Sense of *organization of educational process* is to create optimal conditions for teaching and cognitive, training and competition, social and communicative activities of student-athlete;

- *Evaluation of educational outcomes* is the level of training of the student-athlete, achieved at a certain stage of education, and others.

The use of the *historical approach* determines the method of studying the nature and content of natural and social objects where the focus is on the formation, development and dynamics of the objects under study.

This approach allows us to consider the studied laws of physics in terms of their evolution. Gremzel argued that the teaching of physics is most effective if it is in its main features in the path of historical development of science. But we cannot agree with K. Hahn, who argued that it is impossible to present to students the historical course of the question, if they do not know a modern look to it.

The use of this approach has identified the presence of the "historical block" material in the structure of the study which reflects not only the key dates associated with the discovery of that or this law, but also certain sporting achievements. There is a parallel in the study of the laws of physics and their transformation in the explanation of certain sporting events. At the same time the most striking examples from the world of sports are selected.

*Concentrated approach* involves the study of a big amount of educational information without increasing the training time due to the greater its systematization (summarizing, structuring). Concentrated training is directed to an in-depth study of subjects by combining the material (lessons) in thematic blocks. It is necessary to take into account the dynamics of the trainees' performance. According to FGOS VO for the students-athletes of direction 49.03.01 "Physical culture" 6 hours of lectures and 18 hours of practical training are allocated for the study of the subject "Physics". Such a small number of classroom hours does not always allow students to master their respective competencies, especially for those student-athletes who are often absent from classes in connection with training and competitions. Concentrated approach has allowed us to organize and summarize a large amount of information, breaking material to the respective blocks. Study of the subject is possible both full-time and distance. Thus, all students-athletes, regardless of the form of training, have access to training materials.

Integration of the approaches discussed above allows to achieve the unity and integrity of the learning process on basis of the relationship to individual specific elements.

## **RESULTS AND DISCUSSION**

Let us consider on the example of one of the classes the use of the integration of the abovementioned approaches in teaching students-athletes "Physics" discipline.

After the title of the topic a brief quotation of an athlete is given that has a direct bearing on this phenomenon; or an excerpt from the folk wisdom, saying that reflect the meaning of the law of the studied physical phenomena, etc.

### **VIBRATIONAL MOTION. RESONANCE. POLE VAULT**

*"All connections between phenomena are established exclusively by all sorts of simple and complex resonances – coordinated vibrations of physical systems"*  
N. Tesla

*Initial level* of material study includes the following blocks: "Problem setting", "Historical block", "Actualizing block (remember)," "Theoretical block (theoretical minimum)."

The block "Problem setting" describes the phenomena observed in everyday life and in sport, the task is set to explain these phenomena in terms of the laws of physics. For example, in everyday life we often observe fluctuations: swaying branches, needles of a sewing machine, a guitar string, etc. Under certain conditions phenomenon of resonance happens: water splashing from buckets, the glass rattling in a window, etc. Hands and feet of human can, too, oscillate (running, walking, swimming, various gymnastic exercises, etc.), and therefore to the mechanics of their movement works on the same formula as the simple mechanical pendulums. The resonance phenomenon is widely used in sports because it helps improve athletic performance with optimum energy load of the athlete. It is proposed to define the condition under which an athlete manages to achieve better results with minimal energy consumption.

The "Historical block" shows historical stages of the study of vibrations: the key dates of discovery and their authors (G. Galileo, Huygens H. Thomson W., Popov A.S. Rabi I. P.N. Lebedev, L.I. Mandelstam, N.D. Papaleksi, N.M. Krylov, N.N. Bogolyubov, A.A. Andronov et al.).

"Block of actualization of knowledge (remember)" comes next in which students "recall" higher school physics. They need to insert the missing words in the definitions (oscillatory motions, harmonic vibrations, free and forced oscillations, self-oscillation, and others.) according to the drawing to determine the type of the pendulum (Physical, Mathematical), to determine the basic characteristics of the oscillations (time, frequency, amplitude).

The "Theoretical block (theoretical minimum)" gives the units of measurement of physical quantities (coordinates, angular displacement, angular velocity, angular acceleration, period, frequency, mass, force, energy) and the basic concepts: the resonance (resonance condition), the period of oscillations of a mathematical pendulum, Hooke's law.

Then the *Basic level* of the material study begins, which includes the following blocks: "Block of knowledge application" and "Self-control block."

In the "Block application of knowledge" it is suggested to draw a parallel between the physical phenomenon and a phenomenon in the sport: the oscillatory motion of a mathematical pendulum and athlete's waving hands with ski poles. It is proposed to answer the question whether the weight / length of sticks (arms length) influences on the frequency / period of the vibrational motions? We consider the resonance condition in which the skier manages to minimize energy costs. We show an example, where an athlete approaching the frequency of steps while walking or running (or strokes while swimming or rowing) to his own frequency of vibrations of the legs or arms (resonance), manages to minimize energy consumption. In the most cost-effective combination of frequency and length of steps or strokes man demonstrates a significant increase in performance.

Then we consider other examples of oscillatory movements in sports: trampoline, springboard jumping. Attention of students is drawn to the process of recovery of the deformed shape of the body (trampoline, springboard). When jumping on the trampoline (in the water) they use an elastic trampoline, which, when straightened, gives the body of an athlete some extra speed and it jumps higher. This process is explained with the help of Hooke's law and the law of conservation of energy.

After learning theoretical material there is "Self-control block", which contains the test questions on the studied material: basic definitions, formulas, units of measurement of physical

quantities. Successful passage of the control test will indicate the passage of the base level of the studied subject.

Now you can go to the next *Increased level* consisting of "Block of broadening and deepening", "Independent work Block"

In the "Block of broadening and deepening" the students get acquainted with additional information, solve qualitative and quantitative high-level tasks. So, it is suggested on the subject to review the biomechanics of pole vault, which is based on the mechanical system of two pendulums: which vary in length and mutually influence each other: the first pole and the pendulum form a jumper; the second pendulum is formed by rotation of jumper body around pole capture places, shoulder girdle. Attention is drawn to the fact that angular movement of the pole to some extent depends upon on the length of both the first and second pendulums. It is concluded that to improve the jump with vault result it is required to shorten the chord of the pole; the greatest distance of the common center of gravity of the jumper at the moment of rotation around the pole grasp place; shortening of the radius of gyration around the pole grasp places. As an addition it is proposed to solve the quantitative problem on resonance condition.

Next is the "*Block of independent work*", which consists of two parts. The first part includes *questions and tasks for independent work*, and the second part - *Tasks for generalization and systematization* of various examples of the studied laws in the world of sports. For example, students are requested to complete the table in which it is necessary to give examples of manifestations of resonance in various sports, designate for each sport the resonance condition and how it affects athletic performance. In the following table students systematize the knowledge of the application of Hooke's law in sports.

The final block of "*Literature*" offers students a list of basic and additional literature for independent reading and expanding their outlook.

## CONCLUSIONS

The examined by us non-standard form of studying the material contributes to a better understanding of natural science picture of the world, the formation of the ability to apply and transform the laws of natural sciences in the field of sports and physical culture of the students-athletes. Students-athletes, studying the laws of physics on specific sports examples, independently set themselves challenges and solve them; they deepen and broaden their horizons, systematize the acquired knowledge.

## SUMMARY

The layered structuredness of material study (initial, basic and advanced) not only makes it easier to assess the degree of assimilation of discipline by the teacher, but it also helps students determine for themselves the results and prospects of their training. The integration of these approaches can be used for teaching student-athletes not only the direction "Physical Education" but also "Adaptive Physical Culture", the various forms of education; both in the classroom and remotely, through home study of course "Physics".

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