UDC 371.1; IRSTI 14.07.07
https://doi.org/10.47526/habarshy.v3i121.739

M.T. KATBAEVA[1], U.A. BAIZAK[2]✉
[1]PhD Doctoral Student of Khoja Akhmet Yassawi International Kazakh-Turkish University
(Kazakhstan, Turkistan), e-mail: Praktika-2013-14@mail.ru
[2]Doctor of Pedagogical Sciences
Khoja Akhmet Yassawi International Kazakh-Turkish University
(Kazakhstan, Turkistan), e-mail: usen.baizak@ayu.edu.kz

THE WAY TO ORGANIZE AN ELECTIVE COURSE ON MECHANICS IN SPECIALIZED TRAINING

Abstract. In this article, we will consider the introduction of students into the future profession through specialized training in secondary schools of Natural Sciences. An analysis of the concept of specialized training is carried out and a definition is given. Ways to increase interest in technical specialties in physics are analyzed. Ways to increase interest in technical specialties in physics are analyzed. In addition, a task has been defined that will increase the role and effectiveness of vocational guidance in schools. The main areas of implementation of these tasks include independent training, knowledge acquisition, education, formation of students 'maturity and development of individual abilities in accordance with their interests, increasing students' interest in activities, i.e. in the construction of machines, engineering, cosmology, aircraft design, satellite ships. The direct dependence of the future professional career of mankind on its initial course at school is discussed. Conducting classes based on the interests and aptitudes of students is organized through an elective course. In this regard, making sure that the tasks of mechanics are necessary for mastering the specialty, the student expands and deepens his knowledge of physics. With the help of professionally-oriented tasks, students are required to take a creative approach to solving them, are forced to think actively, are taught to apply physical knowledge in professional activities, use mathematical tools in solving problems, and develop skills in working with literature.

Keywords: school of natural science, specialized training, directed training, task, educational and methodical task.

М.Т. Қатбаева[1], Ұ.А. Байзақ[2]
[1]Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университетінің PhD докторанты
(Қазақстан, Түркістан қ.), e-mail: Praktika-2013-14@mail.ru
[2]педагогика ғылымдарының докторы
Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті
(Қазақстан, Түркістан қ.), e-mail: usen.baizak@ayu.edu.kz

Механиканы бейіндеп оқытуда элективті курсты ұйымдастырудың бір жолы

Аңдатпа. Бұл мақалада жаратылыстану бағытындағы орта мектеп оқушыларын бейіндік оқыту арқылы болашақ мамандыққа баулу қарастырылады. Бейіндеп оқыту

Бізге дұрыс сілтеме жасаңыз:
Katbaeva M.T., Baizak U.A. The Way to Organize an Elective Course on Mechanics in Specialized Training // *Ясауи университетінің хабаршысы.* – 2021. – №3 (121). – Б. 118–128. https://doi.org/10.47526/habarshy.v3i121.739
Cite us correctly:
Katbaeva M.T., Baizak U.A. The Way to Organize an Elective Course on Mechanics in Specialized Training // *Iasaui universitetinin habarshysy*. – 2021. – №3 (121). – B. 118–128. https://doi.org/10.47526/habarshy.v3i121.739

ISSN-p 2306-7365
ISSN-e 2664-0686

ұғымына талдау жасалып, анықтама берілген. Физика пәнінде техникалық мамандықтарға қызығушылықты арттыру жолдары талданған. Сонымен қатар, мектептегі кәсіби бағдардың рөлі мен тиімділігін арттыратын тапсырма анықталды. Осы тапсырмаларды жүзеге асырудың негізгі бағыты ретінде оқушыларда өзіндік дайындалу, білім алу, тәрбиелену, жетілуді қалыптастыру және қызығушылығына сай жеке қабілетін дамыту, іс әрекеттің, яғни машина құрылымына, инженерлік мамандыққа, космология, ұшақ, спутникті корабльдер құрастыруға оқушылардың қызығушылығын арттыруды жатқызуға болады. Адамзаттың болашақ кәсіби мансабы мектептегі алғашқы бағытына тікелей тәуелділігі талқыланған. Білім алушылардың қызығушылықтарын, икемдерін ескере отырып, сабақ жүргізу элективкурс арқылы ұйымдастырылған. Осы орайда, мамандықты игеру үшін механика есептерінің қажеттілігіне көз жеткізіп, физика білімін кеңейтеді, тереңдетеді. Кәсіби бағытталған міндеттерді қолдану арқылы білім алушылардан оларды шешуге шығармашылық көзқарасты талап ету, белсенді ойлауға мәжбүр ету, физикалық білімді кәсіби қызметте қолдануға үйрету, есептер шығару кезінде математикалық аппаратты қолдану, әдебиетпен жұмыс жасау дағдыларын қалыптастыру жүзеге асырылады.

Кілт сөздер: жаратылыстану бағытындағы мектеп, бейіндеп оқыту, бағыттап оқыту, тапсырма, оқу-әдістемелік тапсырма.

М.Т. Катбаева[1], У.А. Байзак[2]
[1]PhD докторант Международного казахско-турецкого университета имени Ходжи Ахмеда Ясави (Казахстан, г. Туркестан), e-mail: Praktika-2013-14@mail.ru
[2]доктор педагогических наук
Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави (Казахстан, г. Туркестан), e-mail: usen.baizak@ayu.edu.kz

Один из способов организации элективного курса в профильном обучении мехнике

Аннотация. В данной статье рассматривается привлечение учащихся к будущей профессии через профильное обучение в средней школе естественнонаучного направления. Проведен анализ и дано определение понятия профильного обучения. Проанализированы пути повышения интереса к техническим специальностям в физике. Кроме того, определена задача, которая повысит роль и эффективность профессиональной ориентации в школе. К основным направлениям реализации этих задач можно отнести самостоятельную подготовку, получение знаний, воспитание, формирование у учащихся зрелости и развитие индивидуальных способностей в соответствии с интересами, повышение интереса учащихся к деятельности, т.е. к устройству машин, инженерной специальности, космологии, конструированию самолетов, спутниковых кораблей. Обсуждена прямая зависимость будущей профессиональной карьеры человечества от своего первоначального курса в школе. Проведение занятий с учетом интересов, склонностей обучающихся организовано посредством элективного курса. В связи с этим, убеждаясь в необходимости задач механики для освоения специальности, ученик расширяет, углубляет знания физики. С помощью профессионально-ориентированных задач осуществляется требование от обучающихся творческого подхода к их решению, принуждение к активному мышлению, обучение применению физических знаний в профессиональной деятельности, использование математического аппарата при решении задач, формирование навыков работы с литературой.

Ключевые слова: школа естественнонаучного направления, профильное обучение, направленное обучение, задание, учебно-методическое задание.

Introduction

Today it is important to look at the training of new staff in all areas in a new way [1]. There is a clear increase in the demand for professional training of specialists of any level. High qualification of the employee is the key to successful work in any job. These new requirements are met by the education system, which provides professional training for young people to fill vacancies in institutions. According to modern requirements, young people who have completed high school have a tendency to choose a profession and try to master it in order to enter the big life.

First of all, let's analyze the concept of "school". The school is an educational institution that teaches and educates the younger generation under the guidance of a teacher. A comprehensive analysis of the research of scientists shows that the educational high school is a pedagogical system created to meet the educational needs of the state, society and the individual. And the pedagogical system is a regulated system that ensures the interaction of goal achievement, that is, access to the formation and development of personality. In this regard, V.P. Bespalko built the pedagogical system from 6 elements: students, learning objectives, learning content, learning process, forms and tools of learning [2]. In order to reveal the essence of these elements, the inclusion of profile learning in the educational process for the upper class, including the pedagogical system, has a positive impact on the individual, his interests and formation, as well as the state and society.

P.R. According to Atutov [3]: "Physics in secondary schools should not directly solve the problem of formation of professional knowledge and skills, but it provides a theoretical basis for selected and combined specialties, provides employee mobility, general theoretical knowledge so that they can quickly adapt to new technologies and manage them competently. Provides sufficient funds". It means special professional skills. Indeed, physical education, detail processing, and the ability to create complex designs are not taught, but intellectual general professional skills can be learned. Among such skills, which, in our opinion, can be developed in students studying physics, we need the ability to formulate and solve problems of professional content based on the active use of physical knowledge.

Methods

In the course of the study, the following methods of scientific research were used:

- theoretical analysis of philosophical, psychological, pedagogical, methodological literature on research problems, as well as concepts, educational standards, educational programs, textbooks and manuals on physics;
- control, questionnaire, interview, analysis;
- defining the goal and conducting training experiments.

Results and discussion

The development of a person's professional career depends on the direction of the student's life, which provides future professional activity. And the principle of life of young people is formed at school. Therefore, the school not only provides basic education, but also takes the first step into the future.

Students' choice of future profession is influenced not only by themselves, but also by their parents, guiding teacher, the market, society and employers. However, the main contributing factor is social need. Today, the world-class industries that do not stop every year: engineering, engineering, technical specialties, etc.

According to scientists, today the task of educational institutions is not only to provide young people with general education, but also to acquire new professions and skills, as well as lifelong learning [4].

In this case, the training of professionals requires students to work independently, starting from school. It includes special, continuous, long-term work of the student with the teacher, who organizes the interpretation of the relationship and interdependence of curricula in different subjects taught in high school.

ISSN-p 2306-7365
ISSN-e 2664-0686

Therefore, the school has a task to increase the role and effectiveness of career guidance. The main directions of these tasks are:

- formation of self-training, education, upbringing, development of students;
- development of personal abilities according to interests;
- It is possible to increase students' interest in the activity, ie in machine building, engineering, cosmology, aircraft, satellite construction.

Remember that your future career depends on your school life. In this regard, let's analyze the profile training.

According to modern pedagogical science, profile teaching is an analysis of teaching that allows to take into account the interests, aptitudes and abilities of students due to changes in the structure, content and organization of the educational process, to create conditions for teaching high school students in accordance with their professional interests and intentions. individualization [5].

Thus, the principles of profile training:

- individualization of training;
- provides for the organization of the educational process, taking into account the individual characteristics of students;
- allows you to create optimal conditions for the realization of the potential of each student (the choice of individual educational programs for each student, the design and implementation of individual forms of educational activities) [6].

Personalization of profile training:

- self-knowledge of students;
- identify their real motives for choosing a study profile;
- identification of specific educational needs;
- implementation of educational programs in accordance with the interests, opportunities and abilities.

Objectives of the transition to profile training:

- Ensuring in-depth study of certain subjects of the full general education program;
- to create conditions for significant analysis of the content of teaching high school students with a wide range of opportunities to create individual educational programs for students;
- Facilitate the establishment of equal access to full education for different categories of students in accordance with their abilities, personal preferences and needs;
- expanding the opportunities for socialization of students, ensuring the continuity between general and vocational education, the most effective preparation of school graduates for the development of higher professional education programs.

The purpose of modern education is to help create the first vector for the development of the child, that is, to help answer the question of how to develop to become a person with their own characteristics.

And physics is a part of universal human culture, which characterizes the intellectual level of society, the level of interpretation of the worldview, the methodological and scientific basis of a comprehensive program of natural sciences, which directly affects social processes. Through the study of physics in the minds of students are formed the recognition of life, the peculiarities of the personality of the subject and object. In addition, the subject of physics is the scientific basis of technology, and therefore one of the leading roles in the profile teaching of physics as a subject. The content of the discipline provides great opportunities to acquaint students with the physical principles of the main industries, technologies of many processes and the organization of labor [7].

In the current situation, we can distinguish the leading industries that use the laws of physics as their scientific basis, such as energy: engineering, control and measurement equipment, regulatory and directional production processes (automation, electronics, etc.), transport, communications, food industry and so on. b. [8].

The physics course has important opportunities to teach some practical skills and abilities, as in the classroom students perform a lot of practical work, including work with physical and technical content.

Students are provided with production and technical material:

- explain the different practical applications of physical laws and phenomena. For example, in the construction of ships and some aircraft (stratostats, airships) takes into account the power of Archimedes;
- Demonstration of existing models of technical devices and instruments;
- conducting production excursions;
- students' home life, transport, etc. b. organization of independent use of physical processes;
- production and technical content can be introduced by solving problems

One of the elements of profile training is elective courses. These are mandatory courses for the selection of students who are part of the higher education profile of the school, ie elective courses are implemented at the expense of the school component of the curriculum and perform two functions. One of them studies the main profile disciplines at the level of a given standard. And the elective course serves for profile specialization and creation of individual educational trajectories.

The purpose of teaching the elective course is to orient students to the individualization and socialization of learning, to prepare them for a conscious and responsible choice of future career.

Objectives of the elective course:

1) expanding students' knowledge of physics;
2) ensuring a high level of knowledge, skills and abilities;
3) active self-determination, including the development of professional orientation;
4) formation and development of cognitive interest in physics, including mechanics.

Based on this, the topic and content of the elective course meet the following requirements:

- social and personal significance, relevance in terms of professional training, as well as personal development of students;
- to promote socialization and adaptation, to choose an individual educational trajectory, to allow conscious professional self-determination;
- support the study of basic and profile general education subjects, as well as provide conditions for the profile socialization of learning;
- contribute to the formation of a holistic picture of the world;
- to promote the development of general education, intellectual and professional skills and competencies, key competencies [9].

Methods and forms of teaching are determined by the level of development and self-development of students, the level of their individual abilities and the requirements of the profile of teaching. The pedagogical methods used are problem-solving and research that stimulate the cognitive activity of students.

The types of elective courses depend on the tasks of the school level, the type of educational institution, local conditions and the class, group, teacher, etc. determined by the capabilities of Discussing the place of the elective course in the profile class, A.G. Kasprzhak distinguished the types, content and methods of work with elective courses, educational tasks (Table 1) [10].

Table 1. Educational tasks in profile training

№	Educational task	Type of elective course	Content and method of work
1	**2**	**3**	**4**
1	Creating conditions for the student in connection with a particular type of professional activity	“Exemplary”	Getting acquainted with the types of activities specific to a person working in a particular field of education (specialty)

ISSN-p 2306-7365
ISSN-e 2664-0686

Continuation of Table 1

1	2	3	4
2	Help a high school student to see different activities in order to carefully study the first presentation of their chosen field	"Guide"	Collective implementation of the unifying project, firstly, several activities, and secondly – the content of several sciences
3	To increase the natural interest of young people in some sciences and laws that are not in the traditional curriculum	"Common culture"	Filling the "common cultural" vacuum
4	Deepening knowledge of physics	"Deepening"	Supplement on physics

There are several types of elective courses:

- in addition to the main specialized courses that provide a high level of teaching physics;
- courses aimed at combining disciplines, which provide interdisciplinary communication;
- A course aimed at preparing students for exams or entrance exams to the university in this discipline;
- a course aimed at mastering highly specialized skills necessary for adaptation to a particular profession or labor market;
- Extracurricular course to expand the horizons of high school students, aimed at meeting the interests of students who are not involved in the school program [11].

The main advantages of the method of teaching elective courses:

- interdisciplinary integration, which contributes to the formation of a holistic worldview;
- collaborative learning;
- interactivity;
- taking into account the individual characteristics and needs of students;
- individual-activity and subject-subject approach.

There are guidelines for the development and design of elective course programs, algorithms, examples of creating a thematic plan of the course, the content of tasks, criteria for assessing student performance of Guzhavin. In his works he gave the rules of the elective course program. It provides for: general rules, purpose, structure, procedure for consideration and approval of course programs on the subject, curriculum of the educational program, the content of the course, information support of the educational program.

According to Kasprzhak A.G. [10], the content of the course must meet the following conditions:

- The course should be designed to allow full use of active forms of organization of lessons, informational, project forms of work;
- The content of the course, the form of its organization should help the student to assess their potential in terms of educational perspectives through successful practice;
- When choosing the content, the teacher should try to answer the questions: "Why does the student choose this course and not another? What is interesting and useful during the course?";

The content of the course can have the following conditions:

- an extended, in-depth version of some parts of the basic course;
- Introduction to one of the "related" sciences, specialties in this discipline;
- a set of individual fragments in different sections of one or more disciplines, if the course is aimed at a certain level of generalization or mastering a certain type of activity.

D.A. Ershov [12] proposes to divide the process of development of elective courses into three stages:

1) analysis of the social order and formulation of ideas,

2) Preliminary drafting of the Program,

3) Execution of the manuscript in accordance with the requirements, discussion of the program.

T.B. Chernikova elective courses of profile training for high school students:

- the actual material is recognizable and relevant;
- The acquired knowledge has a pragmatic orientation, they can be used in everyday life;
- The orientation of education in higher education is reflected not only in the complexity of the material, but also in the forms of work (seminar, colloquium, abstract, test, project);
- The subject of the lessons will be the personal life of students, their future prospects and options for educational, professional and civic activities;
- The accuracy of the work of students in the classroom is presented in a variety of tasks according to the level of complexity;
- Mastering the methods of preparation for the exam at school, college, university will be carried out not only on the main content, but also during special courses in psychology and vocational guidance;
- Methods of personal self-development, ways to enhance external attractiveness and ways to improve housing and living conditions will be the content of project tasks [12].

Summarizing the methods of organizing an elective course, we have prepared an elective course for the organization of specialized training in Mechanics. As for him.

Elective course “Applied Physics and Technology”

Number of hours for the elective course program: 105 h.

The course aims to improve the preparation of students to master the basic sections of physics.

The main objectives of the course:

- development of interest in physics and solving physical problems;
- Improving the knowledge and skills acquired in the main course;
- to form an idea of the methods and techniques of solving physical problems at school, their classification, formulation.

The program of the elective course is agreed with the requirements of the state educational standard and the content of the main programs of the physics course of the profile school. It directs the teacher to further improve the knowledge and skills acquired by the student. To do this, the whole program is divided into several sections. The first part acquaints students with the minimum information about the concept of “task”, gives an idea of the essence of the tasks encountered in life, science, technology, introduces various aspects of the task. Particular attention should be paid to tasks related to the professional interests of students, as well as the tasks of interdisciplinary content. When working with the task, it is necessary to pay attention to the worldview and methodological generalization: the needs of society and problem-solving, tasks from the history of physics, the importance of mathematics for solving problems, systematic analysis of physical phenomena in solving problems, etc. B. Reading the first part can take different forms of lessons: conversation or narration, students' answers, detailed explanation of examples of problem solving, collective assignment of experimental tasks, individual and collective work on task design, etc. B. As a result, students should be able to classify the proposed task, create simple tasks, consistently perform and explain the stages of solving tasks of medium complexity. When solving problems in mechanics, the main focus is on the formation of problem-solving skills, the accumulation of experience in solving various problems. At this point, a general approach to solving problems, such as the description of any physical phenomenon by physical laws, develops. The content of the topics is chosen in such a way as to form the basic methods of this physical theory in solving problems [13].

ISSN-p 2306-7365
ISSN-e 2664-0686

Classes use collective and individual work; setting, solving and discussing tasks, preparation for the Olympiad, selection and formulation of topics, etc. as well as homework to solve tasks. As a result, students will be able to reach the theoretical level of problem solving: decision-making on a specific plan, mastering the basic methods of solution, a sense of responsibility for solving the problem, self-monitoring and self-assessment, modeling of physical phenomena, etc. b.

The full program of the elective course is given in detail in the dissertation, and in this article we will show the concepts of mechanics, which are used only in the profile teaching of physics in engineering.

Taking into account the above requirements, the formation of professional skills using mathematical modeling in future professional activities in the teaching of physics to students with an interest in engineering [14]. The main rule of the method is the combination of physical and technical theories (Table 2).

Table 2 – Interrelation of mechanics and technical theory

№	Mechanics	Technical theory
1	Kinematics	Theory of strength and durability of machines and mechanisms, theory of mechanisms and machines, basics of machine parts and assembly
2	Dynamics	Theory of strength and durability of machines and mechanisms, theory of mechanisms and machines, basics of machine parts and assembly
3	Relativistic mechanics	Technology and technological processes, cutting theory, elasticity theory, elasticity theory
4	Solid state mechanics	Theory of strength and durability of machines and mechanisms, the theory of mechanisms and machines, the theory of dislocation, the theory of cutting, the theory of elasticity,
5	Mechanics of liquids and gases	basics of machine parts and assembly, pipeline theory, dislocation theory, technology and technological processes

As a result of such teaching methods, students develop a special type of thinking-engineering thinking, which arises and manifests itself in solving engineering problems that allow to quickly, accurately and radically solve problems aimed at meeting the technical needs for knowledge, methods and techniques for the creation of technical means and technology.

Let's pay attention to the classification of problems that shape engineering thinking.

1. Issue of reports with technical content. The use of such problems in the learning process helps to acquaint students with the construction of mechanisms and machines, the principle of operation, power transmission and conversion, industrial production technology, controls, the ability to apply physical knowledge to explain the operation of technical objects. By solving such problems, students gain a deeper and stronger understanding of the studied physical concepts, phenomena and their laws, receive information about new achievements and problems of science and technology, the features of technical specialties.

Example of a technical report: One of the wells near Astana produces 50,000 m3 of hot water per day at a temperature of 60° C. If the water cools to 200 C, how much heat will the well produce per week?

2. Practice-oriented projects. Project activities allow to increase learning productivity, practical orientation of training. Learning through project activities allows students to acquire a qualitatively new knowledge based on a comprehensive study of the working material and the integration of design and engineering solutions. As a result of design activities, students become engineers, designers, technologists, etc. b. get the first ideas about the work. For example: Battery Anatomy subproject

The project includes the following components: history of the first batteries, types of batteries; construction of batteries, the principle of operation of batteries; principles of use and disposal of batteries.

Here is an example of an experimental problem performed at home as a project.

1 report. How to know the speed of tap water using a cylindrical jar and a caliper?

Solution: Find the volume by measuring the height and diameter of the caliper and the vessel:

$$V = \frac{\pi d_1^2 h}{2} \quad [1]$$

Then, with the help of a stopwatch, we calculate the time t to fill the jar of water. Then the amount of water at a given point in time is equal to:

$$Q = \frac{V}{T} = \frac{\pi d_1^2}{4} * \frac{h}{t}$$

Or

$$Q = S * v = \frac{\pi d_2^2 v}{4} \quad [2]$$

d_1- diameter of the tap

By aligning the right sides, we get:

$$v = \left(\frac{d_1}{d_2}\right)^2 \frac{h}{t} \quad [3]$$

d_2 – Since neither can be calibrated and measured, the problem can be considered solved.

2 reports. It is necessary to determine the resistance of the iron in operation (we assume that its power is unknown). We have equipment for electricity meters and radios. Network-powered and battery-powered radios should be considered special cases. How do we do the work?

Solution: Put the radio on the beacon program. The program is timed every half hour. We use an electric meter to determine the amount of electricity consumed between one signal on the beacon and the other. Then we determine from the following formula.

$$A = Nt \quad [1]$$

We can calculate the power of the iron, and then, knowing the voltage of the city line, we find the obstacle we are looking for:

$$R = \frac{U^2}{N} = \frac{tU^2}{A} \quad [2]$$

This is how the report looks when you have a battery receiver.

And if the receiver is powered by the city network, it is necessary to first calculate its own power consumption for half an hour, and then calculate the power consumption of the iron and the receiver at the same time. Then from the system of inequalities we get:

$$A_0 = Nt \text{ және } A = (N + N_0)t \quad [3]$$

Where N_0 and N are the power of the receiver and the iron. Find the power of the first iron:

$$N = A - \frac{A_0}{t} \quad [4]$$

And then we find its resistance:

$$R = \frac{U^2 t}{A} - A_0 \quad [5]$$

By solving such problems, students expand, deepen and systematize their knowledge of physics, making sure that it is necessary for mastering the profession. The use of professionally oriented tasks requires students to take a creative approach to solving them, forces active thinking,

ISSN-p 2306-7365
ISSN-e 2664-0686

teaches the application of physical knowledge in professional activities, uses mathematical apparatus in calculations, develops skills of working with literature.

During the task, the student can get advice from the teacher. It is important that the teacher only directs the student to find the right solution.

Conclusion

Experience has shown that students themselves prefer to solve professionally oriented problems, as they begin to understand the meaning and necessity of the subjects taught, see the possibility of applying their knowledge and skills in further study, especially in specialized disciplines, and then in professional activities. We will have the opportunity to teach with interest.

BIBLIOGRAPHY

1. Zoe Martínez-de-la-Hidalgaa1, & Lourdes Villardón-Gallego. Evolution of the Concept of the Teaching Profession in Secondary School Teacher Training // Zoe Martínez-de-la-Hidalgaa, & Lourdes Villardón-Gallegoa, Procedia - Social and Behavioral Sciences 217. – 2016. – P.74–83.
2. Беспалько В.П. Природосообразная педагогика. – М., 2008. – 468 с.
3. Намсараев С.Д., Занаев С.З. П.Р. Атутов – ученик и продолжатель научной школы политехнического образования М.Н. Скаткина // Проблемы современного образования. – 2018. – №2. [Электронный ресурс]. URL: https://cyberleninka.ru/article/n/p-r-atutov-uchenik-i-prodolzhatel-nauchnoy-shkoly-politehnicheskogo-obrazovaniya-m-n-skatkina (дата обращения: 10.11.2020).
4. Abbakumov D. The solution of the “cold start problem” in e-Learning // International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013). Procedia - Social and Behavioral Sciences 112. – 2014. – P. 1225–1231.
5. Шамова Т.И. и др. Управление профильным обучением на основе личностно ориентированного подхода: Учебно-методическое пособие. – М.: центр «Пед. поиск», 2006. – 160 с.
6. Баловик О.А. Физика элективные курсы. – В.: Учитель, 2008.
7. Орехов В.П., Усова А.В. Методика преподавания физики в 8-10 классах средней школы. – М.: Просвещение, 1990. – 320 с.
8. Нуркасымов А., Чумак Н.Ф. Профильное обучение физике как педагогическая проблема // Современные проблемы науки и образования. – 2006. – №2. – С. 103–104.
9. Ulzhamal Konakbeyeva, Zholdasbekova Saule Abdrazahovna, Mehmet Erdogan Preparation of future teachers for the organization of profile training in 12-year school // International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013). Procedia - Social and Behavioral Sciences 112. – 2014. – P. 1232–1236.
10. Низамов И.М. Задачи по физике с техническим содержанием. – М.: Просвещение. 2008. – 130 с.
11. Каспржак А.Г. Элективные курсы в профильном обучении: сборник. – Москва: НФПК, 2014. – 143 с.
12. Егорова А.М. Профильное обучение и элективные курсы в средней школе // Молодой ученый. Теория и практика образования в современном мире. Том I. – М., 2009. – С. 173–177.
13. Крайнева И.А., Марчук А.Г. Игорь Васильевич Поттосин. Из истории Новосибирской школы программирования // Вестн. НГУ. Сер. матем., мех., информ. – 2013. – Р. 3–12.
14. Масленникова Л.В., Арюкова О.А., Родиошкина Ю.Г. Методика подготовки будущих инженеров к применению математического моделирования в профессиональной деятельности при обучении физике в вузе // Вестник Нижегородского университета им. Н.И. Лобачевского. Серия: Социальные науки. – 2016. – №2 (42). – С. 188–193.
15. Tuning Educational Structures in Europe. Competences. Methodology. [Electronic resource]. URL: http://www. relint. deusto.es/ tuning proget / index.htm.

REFERENCES

1. Zoe Martínez-de-la-Hidalgaa1, & Lourdes Villardón-Gallego. Evolution of the Concept of the Teaching Profession in Secondary School Teacher Training // Zoe Martínez-de-la-Hidalgaa, & Lourdes Villardón-Gallegoa, Procedia - Social and Behavioral Sciences 217. – 2016. – R.74–83. [in English]
2. Bespalko V.P. Prirodosoobraznaya pedagogika [Nature-like pedagogy]. – M., 2008. – 468 c. [in Russian]
3. Namsaraev S.D., Zanaev S.Z. P.R. Atutov – uchenik i prodolzhatel nauchnoi shkoly politekhnicheskogo obrazovaniya M.N. Skatkina [P.R. Atutov is a student and a follower of the scientific school of Polytechnic education of M.N. Skatkin] // Problemy sovremennogo obrazovaniya. – 2018. – №2. [Elektronnyi resurs]. URL: https://cyberleninka.ru/article/n/p-r-atutov-uchenik-i-prodolzhatel-nauchnoy-shkoly-politehnicheskogo-obrazovaniya-m-n-skatkina (data obrashcheniya: 10.11.2020).
4. Abbakumov D. The solution of the “cold start problem” in e-Learning // International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013). Procedia - Social and Behavioral Sciences 112. – 2014. – R. 1225–1231. [in English]
5. Shamova T.I. i dr. Upravlenie profilnym obucheniem na osnove lichnostno orientirovannogo podhoda [Management of specialized training based on a personality-oriented approach]: Uchebno-metodicheskoe posobie. – M.: centr «Ped. poisk», 2006. – 160 s. [in Russian]
6. Balovik O.A. Fizika elektivnye kursy [Physics elective courses]. – V.: Uchitel, 2008. [in Russian]
7. Orekhov V.P., Usova A.V. Metodika prepodavaniya fiziki v 8–10 klassah srednei shkoly [Methods of teaching physics in grades 8-10 of secondary school]. – M.: Prosveshchenie, 1990. – 320 s. [in Russian]
8. Nurkasymov A., Chumak N.F. Profilnoe obuchenie fizike kak pedagogicheskaya problema [Specialized training in physics as a pedagogical problem] // Sovremennye problemy nauki i obrazovaniya. – 2006. – №2. – S. 103–104. [in Russian]
9. Ulzhamal Konakbeyeva, Zholdasbekova Saule Abdrazahovna, Mehmet Erdogan Preparation of future teachers for the organization of profile training in 12-year school // International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013). Procedia - Social and Behavioral Sciences 112. – 2014. – R. 1232–1236. [in English]
10. Nizamov I.M. Zadachi po fizike s tekhnicheskim soderzhaniem [Physics problems with technical content]. – M.: Prosveshchenie. 2008. – 130 s. [in Russian]
11. Kasprzhak A.G. Elektivnye kursy v profilnom obuchenii: sbornik [Elective courses in specialized education: collection]. – Moskva: NFPK, 2014. – 143 s. [in Russian]
12. Egorova A.M. Profilnoe obuchenie i elektivnye kursy v srednei shkole [Profile training and elective courses in secondary school] // Molodoj uchenyi. Teoriya i praktika obrazovaniya v sovremennom mire. Tom I. – M., 2009. – S. 173–177. [in Russian]
13. Kraineva I.A., Marchuk A.G. Igor Vasilevich Pottosin. Iz istorii Novosibirskoi shkoly programmirovaniya [From the history of the Novosibirsk School of Programming] // Vestn. NGU. Ser. matem., mekh., inform. – 2013. – R. 3–12. [in Russian]
14. Maslennikova L.V., Aryukova O.A., Rodioshkina Yu.G. Metodika podgotovki budushchih inzhenerov k primeneniyu matematicheskogo modelirovaniya v professionalnoi deyatelnosti pri obuchenii fizike v vuze [Methods of training future engineers for the use of mathematical modeling in professional activities when teaching physics at a university] // Vestnik Nizhegorodskogo universiteta im. N.I. Lobachevskogo. Seriya: Socialnye nauki. – 2016. – №2 (42). – S. 188–193. [in Russian]
15. Tuning Educational Structures in Europe. Competences. Methodology. [Electronic resource]. URL: http://www. relint. deusto.es/ tuning proget / index.htm.