
АННОТАЦИИ

Abstracts

Measuring the Quality of University Education Using Genetic Algorithms and Neural Networks

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Key words and phrases: genetic algorithms; quality of education; neural networks.

Abstract: Research on the quality of education has attracted a lot of attention as the ongoing reform of teaching in higher education continues to deepen. The key to improving the quality of education is to improve the level of teaching, and the assessment of teachers' competencies is an important tool for this. As a result, educational management requires the development and improvement of a system for assessing the quality of teaching. On the other hand, traditional approaches to assessing the quality of education are problematic due to their limitations. As a result, a scientifically based model for assessing the quality of teaching (bachelor's degree) should be developed. We present a unique model for assessing the quality of classroom teaching in colleges and universities, based on improved genetic algorithms and neural networks. The main idea is to use adaptive mutation genetic algorithms to refine the initial weights and thresholds of the BP neural network. Teaching quality score results have been improved by improving neural network prediction accuracy and convergence rate, resulting in a more practical framework for teaching quality scores in colleges and universities. We conducted simulation experiments and comparative analysis; the mean square error of the results of the proposed model is very low, which proves the efficiency and superiority of the algorithm.

Intelligent System for Evaluating Educational and Methodological Aids

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Key words and phrases: training; word processing; analysis; intelligent system.

Abstract: The aim of this study is to develop an algorithm for processing educational and methodological aids for their subsequent evaluation. The following tasks are set: to search for the optimal number of keywords; to determine of the number of pages of the manual, figures and tables in it. The research hypothesis is based on the assumption that the quality and clarity of the material allows students to master the discipline and develop practical skills if the training materials are well-designed. This study proposes a model for evaluating prepared textbooks and guidelines for students of Orenburg State University. The results obtained made it possible to improve the quality of the prepared teaching and methodological aids, which, in turn, improved the level of knowledge acquisition among students.

Correction of the Development Trajectory of Preschool Children through Recommendations on Declining Indicators Identified by the Electronic Educational System “Electronic Map of Child's Individual Development” (ekirr.ru)

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Key words and phrases: electronic map of child's individual development; electronic educational system; collection, storage, processing of data.

Abstract: The purpose of this study is to consider the system “Electronic map of child’s individual development”. The objectives are to develop an electronic educational system “Electronic Map of the Child’s Individual Development” (**EMCID**), consisting of modules for processing and analyzing data, monitoring the results of students mastering the content of the basic educational program of preschool education (**BEPPE**), forming individual electronic portfolios of students, diagnosing the individual development of a preschooler. A contextual diagram of maintaining an electronic chart of the child's individual development is given. The algorithm of the actions of the teacher is shown, through which the collection, storage and processing of data will be carried out for the further construction of the trajectory and development of the preschooler in EMCID. The results are as follows: an example of adjusting the development trajectory of a preschool child through recommendations on declining indicators identified by the electronic educational system “Electronic map of the child's individual development” was demonstrated.

Management of Social Development of Regions

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Key words and phrases: gross regional product; the size of the income level; mathematical model; scientific and technical development; population density; estimated need for housing; social housing by regions of the Russian Federation.

Abstract: The purpose of this study is to consider a mathematical model for calculating the parameters of managing the social development of the regions of the Russian Federation on the basis of statistical data on the population distribution; the amount of cash income in the constituent entities of the Russian Federation. The objectives are to divide the population of the region into groups – they are not able to purchase housing without the help of subsidized funds from the state, they can independently pay for living in social housing, they can build housing with the help of a mortgage – and calculate the percentage for each group. Conclusions are as follows: the percentage of housing provision in the region is shown. A mathematical model is also presented that allows determining the relationship between the subsistence minimum and per capita income for individual regions of the country. The results are as follows: the economic parameters of the development of the regions calculated by the models make it possible to determine the trend in the growth of social dependency and outline ways to solve this problem.

Approaches to the Choice of Method of Comparative Analysis and Modeling

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Key words and phrases: comparative analysis; system analysis; modeling; procedure and comparison models.

Abstract: Comparison can be considered as a cognitive activity and as an activity of everyday life.

The relevance of the research topic is determined by the fact that a comparative analysis allows you to connect new knowledge with a picture of the world. The history of science shows that the practice of comparison is a resource for solving problems of natural and social cognition. The purpose of the article was to study the main scientific approaches to the choice of the method of comparative analysis and modeling. In this article, comparative research methods were used, which in a broad sense are complex studies that include various methods. Objects are compared according to selected criteria and parameters. Comparison as a procedure has qualitative differences. The article analyzes such differences, as well as the methods and procedure (dichotomous division) of comparative analysis.

MapReduce Distributed Parallel Processing Platform in Cloud Computing

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Key words and phrases: MapReduce; calculations; data; platform; technologies.

Abstract: As a new force in the IT industry, cloud computing is a central trend in the development of next generation network services technology. Building on existing network technologies, cloud computing uses virtualization to create virtual machine images that scale across hardware devices and operating platforms in near real time. These virtual machines are sold as a service and can be personalized to meet the needs of customers, providing them with virtualized resources such as compute, memory, and storage. In the context of the information explosion of the XXI century. cloud computing technology provides a good operating environment for parallel computing, the main technology for processing big data. However, traditional parallel computing engines such as MapReduce are designed for static and homogeneous computing environments, while MapReduce runs primarily on physical machines. However, cloud computing provides elastic and cost-effective virtual machines as computing resources. In cloud computing, virtual machine resources can be dynamically configured according to users' actual business needs using the virtual machine supervisor, indicating that cloud computing environments are dynamically heterogeneous.

The aim of the study is to analyze distributed parallel processing in cloud computing.

The hypothesis is the assumption that Big Data processing capabilities provided by cloud computing technology allow us to analyze and assimilate the endless stream of information, knowledge and wisdom contained in big data.

The results are as follows: under the conditions of the parallel programming model based on MapReduce, the performance of distributed parallel processing in cloud computing can be greatly improved and strengthened, and in the future, the development trend will reach dynamic data distribution.

The research methods are synthesis and analysis of scientific sources on the research topic.

Optimization of Traffic Management in Intelligent Transport Systems

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Key words and phrases: transport system; control; road traffic; intelligent transport system; optimization.

Abstract: This article deals with issues related to traffic management. The aim of the study is to find a way to control the flow of vehicles. To do this, we first consider a system of multi-agent vehicles with reactive coordination. Then we propose an optimized method for managing intersections to eliminate conflicts and congestion in the transport system. The results show that vehicles can move alternately without stopping at intersections while maintaining a certain radius.

Modeling the Processes of a Laboratory Information System at a Manufacturing Enterprise

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Key words and phrases: laboratory information management system; business process modeling; automation in production; development of an information system.

Abstract: The article considers the experience of using laboratory information management systems (LIMS) in several enterprises. To automate routine operations related to the operation of LIMS systems, modern business process modeling environments in BPMN 2.0 and IDEF0 notations are used. The paper describes the process of formalizing business processes for using both the system itself and the results of its work. The result of a comprehensive description, optimization and automation of laboratory information management processes was an increase in the efficiency of the work of the enterprise unit.

Using a Graphical Model in Production Planning in the Automotive Industry

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Key words and phrases: data analysis; modeling; three-dimensional space; Markov chains.

Abstract: The aim of the research is to increase efficiency and reduce costs in the production of cars using a graphical model. To achieve this goal, a modeling technique has been developed and described, which has a graphical representation and a global view of the analyzed area. Research methods are based on identifying patterns in data arrays and mathematical statistics. As a result, a method was identified to improve the efficiency of car production, which consists in identifying significant patterns in the data and promptly responding to them.

Decision-Making Model for Choosing an Electric Vehicle Charging Station

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Key words and phrases: electric car; charging station; charging time; charging cost; optimization; simplex method.

Abstract: The world is witnessing a steady increase in the number of electric vehicles. But along with the increase in the share of electric transport, the load on the electric and transport networks of the city increases, which causes a number of problems. The article presents a model for the optimal choice of a charging station by an electric vehicle at a certain point in time, taking into account the properties of the transport and electric power systems. The optimization model includes two interrelated objective functions: minimization of total costs and total time costs. The conducted studies show the effectiveness and validity of the proposed decision-making model for choosing a charging station.

The Use of Artificial Intelligence in Automated Process Control Systems

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Key words and phrases: automated process control system; automated information processing and

control system; artificial intelligence; optimization; forecasting; human factor.

Abstract: The purpose of the study is to identify the possibility of using artificial intelligence (AI) at each stage of the information interaction of automated process control systems (APCS). To achieve the goal, it is necessary to complete the following tasks: to determine the scope of AI, to identify the impact of the use of AI on the components of information interaction of APCS. The hypothesis of the study is the assumption that the use of AI in automated process control systems will reduce the influence of the human factor at many stages of information interaction. In the course of the study, methods of analysis, synthesis, and modeling were used. The results obtained allow us to determine the role of AI in automated process control systems.

Development of an Integration Algorithm to Provide Access to the Intercom Service

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Key words and phrases: information technologies; integration; intercom service; algorithm; Information Systems.

Abstract: The hypothesis of the study is to implement an algorithm for the interaction of a mobile application with a set of tools for developing an intercom service. The research objective is to guarantee efficient, fundamental and secure data exchange between software products not originally designed to work together. The purpose of the study is to provide access to subscribers to the intercom service, for which the sign “Intercom is on” is set. The research methods are analysis and synthesis of intraorganizational business processes.

Development and Research of a Mixture Application Device Using a Dosing Grid

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Key words and phrases: additive technologies; casting shape; 3D printing; sand mixture; experimental setup; mesh dispenser; vibration motors.

Abstract: The article is devoted to solving one of the problems of research and design of robotic systems for producing casting molds using additive technologies. Currently, manufacturers are faced with the task of import substitution of high-tech equipment. When creating new 3D printers that use additive technologies for the manufacture of foundry sand molds, scientific research on the operation of each unit is necessary. In the present study, an experimental setup for applying a mixture using a dosing grid for automated production of casting molds is presented; the components of the installation are described. Experimental work was carried out on the installation to study the distribution of sand, as well as the application of several layers. The conclusions drawn from the results of the experiments indicated positive technical design solutions for using a dosing grid when applying the sand mixture.

Load Balancing Technique for Solving the NP-Complete Problem of Combinatorial Optimization by Dynamic Programming

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Key words and phrases: distributed computing system; dynamic programming; discrete optimization; knapsack problem; load balancing.

Abstract: At present, the architecture of modern processors is constantly becoming more complex. As hardware architecture evolves, computing technology must also evolve. The purpose of this article

is to investigate the practical efficiency of parallelization, for which the solution of the well-known knapsack problem is implemented. Parallelism is implemented using OpenMP. A theoretical estimate of the computation time is proposed. Computational experiments were carried out and the limit of growth of acceleration with an increase in the number of nodes was obtained. Experiments confirm the theoretical assessment given in the article.

Development of a Telegram-Bot to Determine the Amount of a Subsidy for Payment of Housing and Communal Services in the Republic of Khakassia

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Key words and phrases: Telegram-bot; design; dialogue script; subsidy; subsidy calculator.

Abstract: In the modern world, messengers allow a person to get answers to a wide variety of questions, including through the popular technology of organizing a dialogue with a bot in cases where unification of user questions and bot answers is possible. The purpose of the study is to develop a chat bot in the Telegram messenger to determine the amount of a subsidy for payment of housing and communal services (HCS). During the implementation of the project, it is necessary to solve the following tasks: to analyze the development tools; design a Telegram bot; implement a chat-bot prototype – a dialogue script; requests to the service of the State information system of housing and communal services (GIS housing and communal services); determining the amount of the subsidy. When designing a chat-bot, methods of structural and object-oriented design of information systems were used. The article presents the results of the empirical part of the study.

Applied Tasks Related to the Construction of an Information Model of Multilevel Controlled Systems

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Key words and phrases: multilevel controlled systems; modeling; information model; applied tasks; optimal distribution of resources; aggregation.

Abstract: The aim of the paper is to study applied problems related to the construction of an information model of multilevel controlled systems. The objectives are to consider the distinctive features and specifics of building information models of multilevel controlled systems, due to their organizational and functional structure; to analyze the concept and essence of mathematical programming. To achieve these goals, analytical, synthetic, inductive and deductive methods of processing case studies, scientific publications and relevant literary sources were used. The results are as follows: the problem of optimal distribution of resources of a hierarchical system is considered as a problem of mathematical programming; its type and features of the solution associated with the efficiency criterion, which is the basis for finding the optimal distribution, are identified; the problem of optimal allocation of resources of a hierarchical system is analyzed as a problem of operations research.

Distribution of Stresses in Metal-Wood Beam Chords Made of Laminated Veneer Lumber under the Action of a Concentrated Force from the Plane of the Sheet across Fibers

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Key words and phrases: laminated veneer lumber; orthotropic plate; stress-strain state; anisotropy;

wooden structures.

Abstract: The purpose of the paper is to determine the function and form of stress distribution for the elements of the chords of metal-wood beams made of laminated veneer lumber (LVL) under the action of a concentrated force in the direction from the plane of the veneer sheet across the fibers. The research objectives are creation of a computational model for determining the stress-strain state of an element made of unidirectional glued veneer loaded with a concentrated force from the plane of the veneer sheet across the fibers in a local area (areas); determination of the stress function; identification of the form of stress distribution; calculation of angles relative to the line of action of the force, for which the minimum and maximum values of stresses are observed (extrema of the function). Methods are as follows: the study was carried out analytically on the basis of the classical provisions of the mathematical theory of elasticity of orthogonal anisotropic plates developed by S.G. Lekhnitsky. A model of the chord of a metal-wood LVL beam in the form of an elastic orthotropic half-space is proposed. The distribution of stresses in LVL under the action of a concentrated force in the direction from the sheet plane across the fibers is considered. The stress function is theoretically determined, the presence of a minimum on the line of action of the force and two maxima on its isolines is analytically confirmed. The values of the angles of the axes, on which the extrema of the function are located, were calculated, which amounted to $\pm 81^\circ$ from the line of action of the force for the maxima and 0° for the minimum. It was found that the family of curves, at points on which normal stresses are equal in magnitude, for LVL loaded with a concentrated force in the direction from the sheet plane across the fibers, has a bean-shaped configuration, which can be used when designing structural units.

Modern Materials for Thermal Insulation of Buildings

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Key words and phrases: thermal insulation; airgel; vacuum insulating panels; bio-based insulation.

Abstract: Currently, thermal insulation of buildings is an integral part of the construction industry. The purpose of this article is to evaluate the effectiveness of the use of thermal insulation materials such as airgel insulation, vacuum insulation panels and bio-based materials as thermal insulation of buildings. The task of the work is to analyze the heat-insulating ability of these materials based on the results of tests conducted by scientists from various universities. Upon reaching the goal, it was revealed that the considered materials can significantly reduce the energy consumption of buildings.

Modern Methods of Shore Protection

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Key words and phrases: bank protection; geomat; gabion; geogrid; retaining wall; spur; coastal zone; slope.

Abstract: This article is devoted to the study of the features of various ways to protect coastlines from destruction, formed under the influence of various hydrodynamic factors. The article explores the following tasks: rationality and the possibility of using various modern methods of shore protection under the influence of wind waves, fluctuations in water levels, currents, ice phenomena. Various ways of strengthening coastlines are presented, depending on specific conditions and tasks: the use of gabions in strengthening coastlines, the use of cost-effective geogrids, the reinforcement of coasts with geomats, the installation of a retaining wall to protect coastal zones from destruction and erosion, the installation of coastal protection spurs to protect coastal zones from their natural transformation. It is concluded which of the considered methods of bank protection is preferable to use depending on natural conditions and technical and economic indicators, which allows rational and efficient use of financial resources,

as well as improving environmental performance and protecting people from the consequences of destruction of coastal zones.

Overview of Chemical Additives for Concrete Mix

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Key words and phrases: concrete mix; water reducers; air entrainers; retarder additives; superplasticizers; accelerators; chemical additives.

Abstract: This article provides an overview of chemical additives for concrete, their classes, properties and scope in practical production are considered. The purpose of the article is to improve understanding of the action of chemical additives and their effect on the concrete mixture. If you determine all the pros and cons of certain types of chemical additives, then it will be easier for specialists to mix in the right proportions with the necessary components.

Calculation of the Thickness of the Insulation of Building Walls under Non-Stationary Humidity Conditions of the Building Envelope

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Key words and phrases: operational humidity; insulation; insulation thickness; styrofoam; aerated concrete; math modeling.

Abstract: This article presents the results of mathematical modeling of a non-stationary humidity regime for a fence with aerated concrete base and expanded polystyrene insulation. It is noted that the calculated operational humidity of building materials is lower than in the regulatory documents. A formula is derived for determining the thickness of the insulation depending on the operational mass humidity of the building wall, taking into account point and linear thermal uniformities. The proposed formula is applied to the calculation of the thickness of the insulation of a cottage house, the walls of which represent a facade heat-insulating composite system. It is determined that for the building under consideration, the thickness of the insulation is 120 mm when calculated according to the norms and 94 mm when calculated taking into account the moisture content of building materials obtained from the results of mathematical modeling. Thus, the possibility of saving when applying the proposed approach has been demonstrated.

Investigation of the Adhesion of Cement Lining to the Pipe Surface

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Key words and phrases: adhesion of concrete to steel; sand concrete; protection of steel pipes from corrosion.

Abstract: The paper deals with the issues of determining the adhesion of a cement-sand coating to the surface of steel pipes during the construction of water conduits. The goal is to develop a new method for studying the adhesion of sand concrete to steel. To achieve the goal, the following tasks were performed: the existing methods for determining adhesion were studied, the method of normal separation was improved, and concretes of various compositions were tested. As a result of the studies performed, a new method for determining the adhesion of concrete to a steel base was proposed.

Features of the Regime of Work and Rest of Builders-Ameliorators

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Key words and phrases: agrarian sphere; Amur region; ameliorative systems; crop areas; production workers; production; labor process; agriculture; builders.

Abstract: Land reclamation plays a major role in increasing the guaranteed crop yields. However, reclamation systems need constant maintenance, restoration, repair, reconstruction and construction. Thanks to the optimization in the field of productivity and labor safety, the efficient operation of a construction company is ensured, therefore, the health, work and rest regime of reclamation builders are of no small importance. The purpose of the article is to explore the features of work and rest of builders-ameliorators. The hypothesis of the study is that the correct mode of work and rest reduces the occupational morbidity of production workers and increases productivity. The article presents statistical data on the current state of reclamation lands in the Amur Region, lists occupational diseases of reclamation builders and unfavorable factors contributing to this. The results of the study are the proposed main directions of a rational work regime, as well as measures to create favorable living conditions, since reclamation builders often work far from home. Methods of comparison, analysis and generalization of data were used.

Determination of the Optimal Dimensions of the Expanded Bored Piles with a Conical Expanded Base

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Key words and phrases: pile foundations; bored piles; piles with a wide base; cone-shaped expansion; specific bearing capacity of the pile.

Abstract: The aim of the paper is to study the effect of using expanded-base cone-shaped bored piles on their bearing capacity. It is expected that this design will be more efficient than others used in practice. The methodology for evaluating the effectiveness of bored piles was considered in detail in [1; 2]. As a result of the research, it was found that the highest specific bearing capacity of an expanded-base cone-shaped pile will be greater for a pile with a base in the shape of a hemisphere (TISE) by 36.5 %, i.e., 1.36 times.

Tourism Objects in Seismically Active Zones as a Tool for Extreme Leisure Activities

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Key words and phrases: object of tourism; seismically active zones; sport; study; architecture.

Abstract: Among natural disasters, earthquakes occupy the first place in the world, according to UNESCO. Seismic safe construction is one of the pressing problems in countries where seismic areas are present. In the context of the economic crisis, the issues of saving funds for the construction of the country's material resources are acute. In recent years, there has been a trend in the design of high-rise buildings in Russia. The design and construction of these buildings requires significant material and technical resources. For tourist buildings, seismic protection systems based on dry friction dampers are widely used, which can be used on different floors of the building. It is necessary to take into account the possibility of increasing the seismicity of the territory, associated with special construction conditions, namely: subsidence of the soil, undermined territories, various man-made impacts, etc.

A Harmonious Combination of New Cultural Objects in the Existing Urban Development

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Key words and phrases: building; cultural objects; problems of urban planning; heritage; functional planning solutions.

Abstract: The aim of the paper is to analyze the harmonious combination of new cultural objects in the existing urban development.

In this paper, the author solves a number of problems:

- to consider objective criteria for combining buildings of different times;
- to present the most successful techniques that contribute to harmonious combinations of objects of different times in construction and stylistically contrasting.

The following hypothesis is formulated in the work: an indispensable condition for the improvement and development of modern architecture is the awareness of the society of the idea of the need to preserve the cultural heritage.

The following types of research are used in the work: a descriptive method, which makes it possible to illustrate the problems of urban planning when new cultural objects are included in the existing building.

As a result of the study, it was concluded that a large number of new and reconstructed objects are waiting for professional awareness. Today, there is an increase in the number of qualitatively new subjects of social activity – organized communities of an open and closed nature, uniting on the basis of common cultural values and various types of communication.

Modeling the Surface of a Cylindroid Using CAD Systems

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Key words and phrases: cylindroid; surfaces of Catalan; surfaces with a plane of parallelism; modern architecture; information modeling technologies; video-deoecology; urban dominants.

Abstract: The purpose of the article is to consider one of the ways of digital modeling of the Catalan surface, a cylindroid, which is relevant for modern architectural design. A cylindroid is a surface with a plane of parallelism, formed by moving a straight line along two curved guides. The tasks are to develop a step-by-step algorithm for creating a three-dimensional model of a cylindroid in a CAD environment, with a sufficient degree of convenience and clarity. The relevance of the topic under consideration is due to the widespread use of Catalan surfaces in modern architecture due to their efficiency, plasticity, diversity and aesthetics of forms. The development of digital modeling technologies has given a new impetus to the problem of creating 3D models of various geometric surfaces. The method of theoretical geometric modeling of surfaces is used. The novelty of the applied approach is as follows: a method for modeling the surface of a cylindroid is proposed from the point of view of the possibilities of its further use in creating information models of buildings and structures in programs that support information modeling technologies.

Social and Environmental Aspects of Designing Promising (Innovative) Low-Rise Residential Facilities

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Key words and phrases: low-rise residential buildings; innovative technologies; social aspect; environmental aspect; design solutions.

Abstract: The article deals with issues related to the analysis of the modern understanding of the quality and efficiency of the formation of architectural space for residential purposes. The purpose of the work is to determine the feasibility of innovative approaches to the design of low-rise residential formations. The objective of the study is to analyze the impact of social and environmental aspects on the development of architectural solutions. The research hypothesis consists in the assumption of the influence of social and environmental aspects on the formation of the architectural space of the residential environment. The study uses applied search and research methods (search, comparison, analysis, systematic approach, generalization) and their synthesis. The result of the research is the structure of factors influencing the formation of residential formations and confirmation of the research hypothesis put forward.

Features of the Formation of the Architecture of Recreational Hotels (Using the Example of the Hotel “Point on the Map” in the city of Priozersk, Leningrad Region)

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Key words and phrases: eco-recreational area; recreational area; recreational hotel; constructivism; functionalism; Ladoga lake; Priozersk.

Abstract: The article considers the features of the recreational areas of the Northern Ladoga region. The possibilities and prospects for the formation and development of tourist infrastructure in these territories, including the prospects for placing recreational hotels as an independent type of objects of temporary stay of tourists, were studied. The features of the architecture of recreational hotels in the Northern Ladoga region are revealed on the example of the hotel complex “Point on the map”.

The purpose of the study is to explore the approaches to placement of recreational hotels in the natural and anthropogenic environment and methods of architectural and landscape organization, taking into account both local and regional features of the organization of spaces and places of temporary residence, and modern international trends in their design and construction.

The research objectives are analysis of the influence of regional and local factors of the Ladoga region on the formation of network structures for recreational and hotel purposes, as well as the identification of methods of architectural and landscape organization and design and construction arrangement of recreational hotels.

The hypothesis of the study is as follows: the formation of network structures of recreational and leisure facilities, due to the implementation of global trends in the fields of architecture and urban planning, does not, however, exclude the regional dependence of specific design and construction decisions, the significance of the influence of local factors on the choice of methods of architectural and landscape organization of recreational hotels, ways of their placement in the natural and anthropogenic environment.

The results of the study: the features of architecture, artistic-style and engineering solutions, as well as landscape-planning techniques for organizing recreational and hotel space were revealed; two subtypes of recreational hotels are defined and characterized; the range of services of a separate network recreational hotel was assessed. On this basis, basic approaches have been established to the formation of modern recreational and hotel complexes that meet the requirements of consumers both for specialized objects of this type and for an eco-tourist environment.

Using Digital Technologies in Teaching Foreign Languages to Students of Non-Linguistic Majors

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Key words and phrases: higher education; foreign language; non-linguistic training; teaching; digital technologies.

Abstract: Teaching foreign languages within the framework of non-core areas of training in universities is accompanied by a number of difficulties. They can be resolved through the introduction of complex digital technologies. The purpose of this study is to search for modern technologies that can improve the efficiency of learning a foreign language by students of non-linguistic training profiles, and options for their implementation in the learning process at a university. Hypothesis: the use of digital technologies makes it possible to diversify the process of learning a language, increase interest in a non-core discipline, and add interactivity to the traditional form of conducting classes. The methodological basis of the study is made up of general scientific methods – description, comparison, analysis, synthesis and concretization. As a result of the study, the most popular foreign platforms were identified – Coursera, edX, Udacity – and their domestic counterpart: “Open Education”. The features of the implementation of such digital solutions in the learning process are specified depending on other initial data – the general level of students' preparation, their motivation, involvement, the number of hours devoted to learning a foreign language, the program of the academic discipline, etc.

Physical Culture as a Factor in Increasing the Resistance of the Human Body to Mental Stress, Stressful Situations and Various Diseases

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Key words and phrases: physical culture; students; body resistance; psycho-emotional overstrain; stress; stress factors; diseases.

Abstract: The relevance of the study is determined by the importance of solving the problem of resistance to stress, finding ways to level them in order to preserve the health and working capacity of students and the insufficiency of research work carried out within the framework of the tasks of revealing the essence of the concept of "stress resistance". The article presents the results of the study, the purpose of which was to identify the physiological characteristics of the body of a university student under the pedagogical influence of physical culture in order to develop measures to prevent or reduce the negative impact of neuro-emotional overload as a disease prevention. The main research methods were used: theoretical analysis and generalization of the results of previous studies, empirical methods, including pedagogical observation and experiment, questionnaire, Landolt test, Spielberger test, calculation of values in terms of the state of the cardiovascular system, general physical performance through PWC170, physical development by calculating the vital capacity of the lungs, calculating the index of functional changes according to R.M. Baevsky and mathematical methods. The results of research activities indicate a positive relationship between the increase in motor activity with the use of physical culture, characterized by a health-improving orientation, and the level of resistance of the human body to mental overstrain, stressful situations and various diseases. The practical significance of the results obtained is due to the possibility of their use in further research activities aimed at eliminating factors and causes that can cause serious physiological deviations in the functional activity of the body and the development of diseases.

Conditions for the Formation of a Healthy Lifestyle of Students

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Key words and phrases: healthy lifestyle; student environment; physical Culture and sport; educational organization.

Abstract: The purpose of the study is to form a healthy lifestyle of students by means of physical

culture with elements of wrestling and boxing. The objective of the study is to increase the level of physical fitness of students. The study assumed that students attending classes with elements of Greco-Roman wrestling have better indicators of physical fitness, including coordination, in contrast to students who do not go in for sports. Research methods are exercises, testing, observation, pedagogical experiment, mathematical data processing. In the course of the pedagogical experiment, it was found that the inclusion of elements of Greco-Roman wrestling in classes allows increasing the level of students' readiness for the formation of a healthy lifestyle.

The Importance of Joint Cultural and Leisure Activities of Children and Adults in the Formation of the Patriotic Consciousness of Students of the Children's Music School

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Key words and phrases: patriotic education; cultural and leisure activities; patriotic consciousness; musical and creative activity.

Abstract: The article highlights the role of joint cultural and leisure activities of children and adults in the formation of the patriotic consciousness of students in the children's music school. The purpose of the study is to experimentally substantiate the effectiveness of the Patriotic program of joint cultural and leisure activities for children and adults. The research objectives are to study the initial level of patriotic consciousness of students of the children's music school; develop and implement a program of patriotic education in the joint cultural and leisure activities of children and adults; to study the final level of patriotic consciousness of children's music school students. Research hypothesis: the process of forming the patriotic consciousness of students will be effective if, in the conditions of a children's music school, a program of joint cultural and leisure activities of children and adults is introduced by means of musical and creative activities of a patriotic orientation. The research methods are methodology "Attitude to Patriotic Values" by I.V. Kuleshova, P.V. Stepanova, D.V. Grigoriev. The results of the study showed that after the implementation of the declared program, there was an increase in the level of patriotic consciousness of children and adolescents, which confirmed the hypothesis put forward.

Digitalization of the Process of Teaching a Foreign Language

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Key words and phrases: digital transformation; digitalization of teaching foreign languages; individualized training; authentic communication; differentiated approach.

Abstract: The aim of the study is to substantiate the structural and functional model of multicultural education of students in the system of activities of a higher educational institution. Research methods – analysis and statistical processing of the obtained data.

Research objectives are to present the individual psychological characteristics of students at different age stages, to determine the role of the educational environment in the formation of students' multicultural competence.

Research hypothesis: the process of teaching a foreign language in modern conditions of digitalization will be most effective if we identify the stages, directions and organizational and methodological conditions for the implementation of the multicultural education model.

Based on the information presented, the authors come to the conclusion that digitalization in itself is not a methodological approach, but can only help in the implementation of existing methods and, if necessary, propose new activities within these methods.

Implementation of Interdisciplinary Connections in the Process of Teaching Physical and Mathematical Disciplines at University

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Key words and phrases: didactic means; interdisciplinary approach; intersubject communications; disciplines of the physical and mathematical cycle; technical university.

Abstract: This article aims to reveal the features of the implementation of interdisciplinary connections in the process of teaching students of a technical university a cycle of physical and mathematical disciplines. The hypothesis is the position that the importance of forming students' understanding of the relationship between the subjects they study affects the quality of education, as it increases the motivation to study and forms an idea of the integrity of the scientific picture of the world. In this regard, the authors of the article solve a number of problems, which include: consideration of approaches to the theoretical understanding of the central concepts of the work; identifying the relevance of maintaining and developing the principles of an interdisciplinary approach in education; demonstration of the most effective ways and means of implementing interdisciplinary connections between physics and mathematics in the process of teaching students of technical areas of training, which is recorded as the results of the study. As the leading methods, the analysis of scientific sources on the problem, synthesis and generalization are determined.

Cyclomatic Complexity of Parallel Algorithms

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Key words and phrases: parallelism; task; methods; cyclomatic complexity; algorithm; operation; flow.

Abstract: This article presents the idea of cyclomatic complexity of parallel algorithms. The goal is to describe and justify the practicality of using the cyclomatic complexity of parallel algorithms. The research hypothesis is as follows: the use of the cyclomatic complexity of parallel algorithms will simplify the complexity of the conditional logic of the program. During the study, the following methods were used: mathematical, theoretical. The result of the study is the presentation of a possible method for numerically solving the cyclomatic complexity of parallel algorithms.

Features of Project Management in Volunteer Activities of Students

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Key words and phrases: project management; project; volunteer activities; student youth.

Abstract: The purpose of the study is to study the features of project management in the volunteer youth movement. To achieve this goal, the following tasks were solved: to reveal the theoretical and methodological aspects of designing student volunteer activities; to conduct a study of the possibilities of designing volunteer activities for students at the Leningrad State Pedagogical University named after P.P. Semenov-Tyan-Shansky; develop recommendations for project management, evaluate its effectiveness. Hypothesis: a project in the field of volunteering of students at the Leningrad State Pedagogical University named after P.P. Semenov-Tyan-Shansky will be successful if: to first characterize the resource provision of project activities in the field of volunteering at a given university, to investigate the attitude of university students to various types of volunteer activities, to

analyze environmental factors for the implementation of this activity. Based on the results of the study, recommendations were developed for project management in the field of volunteering of student youth of this university.

Formation of Competence of a Preschool Teacher in the Field of Creating Educational Digital Content

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Key words and phrases: creation of educational content; preschool teachers; digital technologies; digital competence.

Abstract: The goal is to form competencies in the field of creating educational digital content for a teacher of a preschool institution (PSI). The objectives are to identify the levels of formation of competencies in the field of creating digital educational content, to formulate the stages of building and implementing a learning trajectory in the field of creating digital educational content. The hypothesis is as follows: if methodological approaches to the formation of competencies among preschool teachers in the field of creating educational digital content are implemented using applied and tool software and their technological support, then this will ensure the achievement of heuristic and creative levels of learning to create and use educational digital content. Methods: a training program was developed for the formation of competencies in the field of creating educational content, including the design of educational content, video production of educational products, the creation of animated educational films and interactive games on the Learning platform Apps.

The Development of Logical Thinking in Visually Impaired Junior Schoolchildren in the Implementation of the Subject Area "Mathematics"

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Key words and phrases: logical thinking; visual pathology; junior school age.

Abstract: The article presents the results of the formation and approbation of the program of empirical research of the features of logical thinking of younger schoolchildren with visual pathology, in particular, modeling and implementation of the correctional educational process aimed at developing logical thinking in the subject area "Mathematics". In the course of the study, the expediency and effectiveness of the implementation of approaches were substantiated: to identify the general goals of the development of logical thinking based on the formation of universal educational actions (establishing links and dependencies between mathematical objects and basic logical universal actions) in the subject area "Mathematics"; to the use of seven types of logical tasks as content lines of the correctional and educational process.

Analysis of Using Exercises for Training the Pianist's Wrists When Playing the Piano

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Key words and phrases: piano playing skills; wrist; practical skills.

Abstract: The relevance of the topic of the article is determined by the fact that training the wrist in piano playing skills is very important and good wrist skills are also indispensable. Therefore, many famous pianist actors attach great importance to wrist training.

The novelty of the research is substantiated; this article is devoted to training the skills of playing the piano. The author emphasizes the importance of wrist training in piano playing and analyzes several methods for training wrist skills.

The research methods are general scientific methods of cognition (logical, comparative, analytical, etc.).

Prerequisites for the Formation of Meme-Art Technology in the Educational Process in Geography

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Key words and phrases: art-memes in education; meme-art technology; methods of teaching geography; prerequisites for the formation of technology; school educational environment.

Abstract: The article announces meme-art technology as an innovative technology for teaching geography. The key unit of innovative technology is the meme-art as a phenomenon of the media space in education.

The purpose of the study is to consider the key prerequisites for the formation of meme-art technology in the teaching and educational process in geography.

Research objectives are to reveal the essence of the term “meme-art” within the framework of meme-art technology; determine the relevance of the use of meme-art technology in the school educational environment; to analyze the prerequisites for the formation of meme-art technology in the educational process in geography.

Research methods are theoretical (analysis and synthesis of philosophical, sociological, psychological and pedagogical literature; generalization of the work experience of geography teachers).

The review study made it possible to substantiate the readiness of school geography to introduce innovative pedagogical technology, to formulate the prerequisites for the qualitative organization of the educational process based on meme-art technology as a guarantee of modernizing school geographical education, increasing the motivation of its subjects and creating a system of integrated educational knowledge.

The Study of Tolerance among Students of a Pedagogical University

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Key words and phrases: tolerance; empathy; students.

Abstract: The article is devoted to the topical issue of tolerance among future teachers. The purpose of this study is to identify the features of the development of tolerance among students of different areas of training and profiles. The objectives of the study are to substantiate the relevance of the problem under study, conduct a study of tolerance using a set of diagnostic techniques and analyze the results. The hypothesis is the assumption that first-year students are characterized by a sufficient level of development of tolerance. The results of the study showed that the hypothesis was confirmed, however, the level of development of empathic abilities, which can be considered as an emotional component of tolerance, is rather low.

Research Competence of Masters: Structure and Content

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Key words and phrases: master; research activities; research competence; professional standards.

Abstract: The purpose of the study is to determine the structure and content of the research competence of masters in the direction of training 09.04.02 "Information systems and technologies". Research objectives are to develop the structure of research competence, to characterize its blocks. Research hypothesis is the assumption that the research competence of masters is presented as a multicomponent structure that serves as the basis for developing a model and technology for its formation. Research methods are theoretical analysis of sources, comparison and generalization of data, deduction and induction. The result of the study is as follows: the structure of the research competence of masters was determined; its components were identified and characterized.

Improving the Methodology for Conducting a Laboratory Workshop in the Course of General Physics for Technical Areas of Training

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Key words and phrases: laboratory work; physics; technology; experiment; technique.

Abstract: The article discusses the use of research orientation in the conduct of educational laboratory work of the course of general physics for students of technical areas of training.

Features of One of the Models of Thermal Radiation

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Key words and phrases: priority value; model; statement; quasi-continuous approximation.

Abstract: The paper considers the laws of thermal radiation: the Stefan-Boltzmann law, the Wien displacement law and the Planck formula. The derivation of Planck's formula within the described model is based on the quasi-continuous approximation.

Therapeutic Physical Culture in Diseases of the Spine

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Key words and phrases: health; physical culture; osteochondrosis; health-improving physical culture; methodology; therapy.

Abstract: The article discusses the impact of an active lifestyle on human health with a sedentary lifestyle. An analysis of various diseases associated with pain in the back and lower back was made. The results of scientific and methodological literature and practical experience have shown an increase in the effectiveness of non-drug methods of treatment. Analyzing the methods of physical therapy, we can talk about the cessation of pain in the lumbar back in half of the cases of the patients who applied.

Features of Professional Training of Future Engineers by Means of Electronic Training Courses in the Moodle System in the Process of Implementing the 2 + 2 Undergraduate Model through the Example of a General Physics Course

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Key words and phrases: higher education; professional training of future engineers; professional competencies; model "2 + 2"; individual educational technologies; general physics course.

Abstract: The purpose of the study was to develop the means of professional training of students – future engineers studying under the “2 + 2” undergraduate model. The objective of the study was to create and test a professionally oriented e-learning course aimed at systematizing students’ independent work in the “2 + 2 with individual educational trajectories” environment. The hypothesis of the study, which is that the use of the course in the Moodle system will be effective for multilevel learning, was tested experimentally. As a result of the study, the advantages of e-learning courses in the Moodle system for the professional training of students – future engineers in the process of implementing the “2 + 2” undergraduate model were identified.

Increasing the Efficiency of Formal Composition in the Process of Teaching Design Students through the Introduction of Digital Technologies

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Key words and phrases: training of designers; formal composition; digital technologies; efficiency.

Abstract: The purpose of the article is to reveal the increase in the efficiency of formal composition implementation by design students of different profiles in the learning process. The goal set determined the objectives of the study: to study the preparation of practical tasks for formal composition and the phased implementation of them; analyze the possibility of performing some tasks in formal composition using digital technologies; determine the way to improve the efficiency of formal composition. In this study, methods such as survey and testing were used. The conducted research and the results obtained made it possible to draw conclusions about the effectiveness of the introduction of digital technologies in the process of teaching students-designers of formal composition.

The History of the Summer Sports Days of the KASSR

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Key words and phrases: summer sports day; competitions; story; Karelian Autonomous Soviet Socialist Republic; championship; Republic of Karelia.

Abstract: This article presents a comparative analysis of the summer sports days in the Karelian Autonomous Soviet Socialist Republic (KASSR).

The main objective of this work is to compare the quality of the organization of summer sports days in the KASSR in the 50–70s. of the last century, with attention to the interesting facts of this event and further comparison with the modern organization and holding of sports and athletics events in various sports in the Republic of Karelia.

Main research methods: theoretical analysis and generalization of scientific and methodological literature, research of archival materials.

The History of the Winter Sports Days of the KASSR

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Key words and phrases: winter sports day; competitions; story; Karelian Autonomous Soviet Socialist Republic; Republic of Karelia.

Abstract: This article presents an analysis of the history of the winter Olympics in the Karelian Autonomous Soviet Socialist Republic (**KASSR**).

The objectives of this paper are to study the history of the winter sports days in the KASSR, to determine the significance of the winter sports days for the introduction of physical culture and sports into the life of the population of the republic, the comprehensive development of winter sports in the sports organizations of the KASSR and the promotion of winter sports among the broad masses of the population of Karelia.

The research methods are theoretical analysis and generalization of scientific and methodological literature, research of archival materials.

The result of the study is as follows: the importance of holding winter sports days for the development of winter sports in the physical culture organizations of the KASSR, as well as the promotion and popularization of winter sports among the population of Karelia, was determined.