Education Institution
«Belarusian State Pedagogical University named after Maxim Tank»

APPROVED
Vice-Rector for Academic Affairs
_____ A. V. Makovchik
_____ 2023
Registration No. УД-03-523-2023/уп

INFORMATION AND ANALYTICAL TECHNOLOGIES IN AN EDUCATION INSTITUTION

Academic programme of the higher education institution for the specialty 7-06-0114-02 Educational Management

2023

The academic programme is developed in accordance with the advanced higher education standard for the specialty 7-06-0114-02 Educational Management and the curriculum for the specialty 7-06-0114-02 Educational Management No. 120-2023/ya as of 21.06.2023

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RECOMMENDED FOR APPROVAL:
by the Department of Pedagogy of the education institution "Belarusian State Pedagogical University named after Maxim Tank"
(Minutes No 13 as of 21.04.2023)

Head of the Department _____ S.N. Sirenko

by the Council of the Faculty of Social and Pedagogical Technologies of the education institution "Belarusian State Pedagogical University named after Maxim Tank"

(Minutes No. 7 as of 11.07.2023

The format of the programme and accompanying materials corresponds to the current requirements of the Ministry of Education of the Republic of Belarus

Methodologist of the Master's Studies Department _____ A.M. Kondybailo

EXPLANATORY NOTE

The goal of studying the discipline "Information and Analytical Technologies in an Education Institution" is the formation of master's degree students' competence in the field of organizing and managing the educational process in education institutions based on digital technologies.

In the programme documents of the Republic of Belarus digitalization is considered as the most important tool of modernizing the economy. However, digital technologies are changing not only the economy, but also have a great impact on society, on the public administration system, on the scientific, cultural and educational spheres. Socialization, education and training of the individual takes place in a new environment in which information technology is a powerful new tool. Education that is adequate to the challenges facing the country in the context of the digital transformation of society (or the so-called advanced education) is one of the most powerful mechanisms of the development of our state in the period of the digital revolution. The digital transformation of the educational process involves changing goals, updating the content and methods of teaching, upbringing and managing the educational process. All mentioned above makes the study of this discipline relevant, and its content is in demand by modern teachers-masters.

The objectives of studying the discipline are to create conditions for:

- understanding by master's degree students of the theoretical foundations of digital transformation of the educational process: scientific, technical and socio-cultural trends that determine the need for digital transformation of the educational process; the essence of digitalization-related changes in education; the role of advanced education in the reproduction and development of human capital in our Republic;
- gaining experience in designing, organizing and managing the educational process based on information and analytical technologies;
- mastering effective methods of collecting and analyzing data for managing an education institution, organizing its information infrastructure.

The place of the academic discipline in the professional training of postgraduates. The elective academic discipline "Information and Analytical Technologies in an Education Institution" belongs to the component of a higher education institution, Module 2.2. "Technology of Educational Management". The discipline is consistent with a cycle of pedagogical disciplines studied at the 1st stage "Pedagogy", as well as with the disciplines studied at the 2nd stage: "Management of the Education Institution", "Diagnostics of the Effectiveness of Management Process".

Competence requirements

Studying the discipline ensures the formation of the SC-3 competence: "To manage the education institution in accordance with the regulations governing educational activities and relations, as well as through the effective use of information and analytical technologies".

As a **result** of studying the academic discipline, master's degree students should **know**:

- educational challenges of the technological revolution, documents that actualize a new vision of education in the digital age;
- the concept of over-professional (cross-cutting) competences associated with the digital revolution: soft skills, computational thinking, design thinking;
- factors and conditions for successful informatization of education in the Republic of Belarus, principles of effective use of ICT in education;
- principles of collecting, analyzing data and organizing the information infrastructure of an education institution.

As a **result** of studying the academic discipline, master's degree students should **be able to**:

- automate data collection and analysis based on analytical methods;
- digitalize the daily types of work of a manager, subject teacher, class teacher;
- manage learning in computerized learning management systems (for example, LMS Moodle or Google Classroom);
- implement elements of distance and blended learning based on network technologies: cloud services for organizing collaboration and communication; complex data analysis tools; visualization in teaching.

Structure of the academic discipline

The programme of the elective academic discipline "Information and Analytical Technologies in an Education Institution" of higher education institution is provided with the following number of classes for full-time education: 96 academic hours in total, 36 hours of which are in-class hours. Distribution of in-class hours according to the type of classes: lectures - 16 hours; practical classes - 20 hours. 60 hours are allocated for self-study of master's degree students. Intermediate certification is carried out in accordance with the curriculum of the specialty in the form of a **test** in the 2nd semester.

The programme of the elective academic discipline "Information and Analytical Technologies in an Education Institution" of higher education institution is provided with the following number of classes for part-time education: 96 academic hours in total, 8 hours of which are in-class hours. Distribution of in-class hours according to the type of classes: lectures - 4 hours; practical classes - 4 hours. 88 hours are allocated for self-study of master's degree students. Intermediate certification is carried out in accordance with the curriculum of the specialty in the form of a **test** in the 3rd semester.

The study load of the discipline is 3 credit units.

CONTENT OF EDUCATIONAL MATERIAL

Topic 1. From informatization to digital transformation of education

Digitalization of society: technological and humanitarian aspects. Characteristics of the fourth industrial revolution. The concept of the humanitarian and technological revolution.

Informatization of education. Factors and conditions for successful informatization of education in Belarus. Information and educational environment of an education institution. Digital transformation of the educational process: the essence and conditions of efficiency, differences from informatization. Information technologies that are successfully used in the educational process in Belarus and abroad.

Upgrading of education as a response to the challenges of the digital world. Comparative characteristics of educational policies in the field of advanced education in Western countries, Russia and Belarus. Computation thinking as a competence of the XXI century.

The impact of information and communication technologies (ICT) on changing approaches to management in an education institution, the development of educational materials, teaching methods, forms of control and assessment.

Topic 2. Personality in the digital age

Features of the development and socialization of the individual in the digital era. The results of sociological surveys, including PISA, on the time spent by schoolchildren in the virtual space and their preferred content. Skilled consumer vs person-creator: megatrends in the development of society through the prism of Internet search queries in different countries of the world, including Russia and Belarus.

New (cross-cutting) competences associated with the digital revolution: soft skills, computation thinking, design thinking. New opportunities and risks of personal socialization in a digital society.

The teacher as the most important component of the successful transition of Belarus to a digital society.

Information competence and hybrid skills of a teacher and manager in the field of education. Forms and methods in professional training that contribute to the formation of information competence.

Topic 3. Software tools for collecting and analyzing data in management

Applied software products for general and special purposes. State-of-the-art technical means in the educational process.

Features of modern technologies for solving problems of text, tabular and graphic processing. Automation of the daily work of an education manager, subject teacher and class teacher. Dealing with visual and multimedia information. Dynamic data visualization and data analytics.

Analysis package for statistical data processing. Descriptive statistics, construction of histograms, etc. Analysis of two samples based on statistical criteria, correlation analysis, etc. Analysis and interpretation of the results of pedagogical measurements.

Topic 4. Organization of information infrastructure of an education institution

Information educational resources of the Republic of Belarus. Requirements and recommendations for the official websites of education institutions. The essence of the projects "E-School" and "Smart City" and the corresponding activities. Configuration of computer equipment. Electronic student card. Services "E-Register" and "E-Diary". Corporate email. Hygienic requirements for the organization of the educational process using ICT.

Distance and blended learning: forms of implementation in schools and institutions of higher education. Blended learning models. Learning management systems (for example Moodle or Google Classroom). Motivation and activation of the activities of teachers and students in the context of distance learning. Formative (active) assessment in the context of distance and blended learning. Choosing an individual educational trajectory for a student.

New opportunities of digital technologies for interactive learning: cloud services for collaboration and communication; complex data analysis tools; visualization in teaching; computer experiment and modelling.

Development of educational and methodological support for a digital lesson.

Topic 5. Improving the educational process in the context of digital challenges

Meanings, values, vision of the future as imperatives of education in the era of the humanitarian and technological revolution. Training and education for sustainable development. Development of competences of the XXI century by means of education. The influence of social networks and computer games on education and personality development. Media security. Information and media competence of the individual. Digital interaction as the means of boosting the efficiency of educational work.

Topic 6. Project activities in the digital educational process

International experience of organizing project education in different countries of the world. The essence of STEM, STEAM approach to teaching. Experience of quantoriums and project training centres in Russia. The Belarusian technopark for schoolchildren. The combination of classroom and extracurricular forms of work for organizing project and research activities.

Online resources and services for organizing project and research activities of schoolchildren and students.

Topic 7. Presentation and defense of projects

Development of projects for the use of digital technologies in the educational process. Presentation and demonstration of one's own developments, findings and best practices related to the digital transformation of the educational process.

EDUCATIONAL AND METHODOLOGICAL CHART OF THE DISCIPLINE
«INFORMATION AND ANALYTICAL TECHNOLOGIES IN AN EDUCATION INSTITUTION»
(full-time form of education)

Number of section, topic	Name of the topic	Number of academic hours		Number of hours for self-study	Forms of assessment
		Lectures	Practical classes		
1.	From informatization to digital transformation of education	2	2	4	Answers to key questions of the lecture (forum in LMS Moodle), lecture support scheme (mind map)
2.	Personality in the digital era	2	2	6	Completing the table "Digital World: Challenges and Responses"
3.	Software tools for collecting and analyzing data in management	2	4	10	Practical assignments
4.	Organization of information infrastructure of an education institution	4	2	10	Design and creation of educational and methodological developments for a digital lesson (interactive worksheets, organization of work with a learning management system)
5.	Improving the educational process in the context of digital challenges	2	2	10	Practical assignments
6.	Project activities in the digital educational process	2	4	10	Defense of projects
7.	Presentation and defense of projects	2	4	10	Reflecting on learning outcomes
	Total	**16**	**20**	**60**	

EDUCATIONAL AND METHODOLOGICAL CHART OF THE DISCIPLINE «INFORMATION AND ANALYTICAL TECHNOLOGIES IN AN EDUCATION INSTITUTION»

(full-time form of education)

Number of section, topic	Name of the topic	Number of academic hours		Number of hours for self-study	Forms of assessment
		Lectures	Practical classes		
1.	From informatization to digital transformation of education	2	2	4	Answers to key questions of the lecture (forum in LMS Moodle), lecture support scheme (mind map)
2.	Personality in the digital era	2	2	6	Completing the table "Digital World: Challenges and Responses"
3.	Software tools for collecting and analyzing data in management	2	4	10	Practical assignments
4.	Organization of information infrastructure of an education institution	4	2	10	Design and creation of educational and methodological developments for a digital lesson (interactive worksheets, organization of work with a learning management system)
5.	Improving the educational process in the context of digital challenges	2	2	10	Practical assignments
6.	Project activities in the digital educational process	2	4	10	Defense of projects
7.	Presentation and defense of projects	2	4	10	Reflecting on learning outcomes
	Total	**16**	**20**	**60**	

EDUCATIONAL AND METHODOLOGICAL CHART OF THE DISCIPLINE «INFORMATION AND ANALYTICAL TECHNOLOGIES IN AN EDUCATION INSTITUTION»

(part-time form of education)

Number of section, topic	Name of the topic	Number of academic hours		Number of hours for self-study	Forms of assessment
		Lectures	Practical classes		
1.	From informatization to digital transformation of education	1		10	Answers to key questions of the lecture (forum in LMS Moodle), lecture support scheme (mind map)
2.	Personality in the digital era	1		10	Completing the table "Digital World: Challenges and Responses"
3.	Software tools for collecting and analyzing data in management	1	2	18	Practical assignments
4.	Organization of information infrastructure of an education institution	1		10	Design and creation of educational and methodological developments for a digital lesson (interactive worksheets, organization of work with a learning management system)
5.	Improving the educational process in the context of digital challenges			10	Practical assignments
6.	Project activities in the digital educational process			10	Defense of projects
7.	Presentation and defense of projects		2	20	Reflecting on learning outcomes
	Total	**4**	**4**	**88**	

INFORMATION AND METHODOLOGICAL SECTION

List of basic literature:

1. Король, А. Д. Как спроектировать и провести эвристическое интернет-занятие. Разработки участников оргдеятельностного семинара, анализ, рефлексия : практикум / А. Д. Король. – Гродно : Гродн. гос. ун-т, 2017. – 67 с.

List of additional Literature:

1. Вайндорф-Сысоева, М. Е. Методика дистанционного обучения : учеб. пособие для вузов / М. Е. Вайндорф-Сысоева, Т. С. Грязнова, В. А. Шитова ; под общ. ред. М. Е. Вайндорф-Сысоевой. – М. : Юрайт, 2018. – 194 с.

2. Данилюк, А. Я. Цифровое общее образование / А. Я. Данилюк, А. А. Факторович. – М. : Авт. мастерская, 2019. – 229 с.

3. Дистанционные образовательные технологии. Проектирование и реализация учебных курсов / М. Б. Лебедева [и др.] ; под общ. ред. М. Б. Лебедевой. – СПб. : БХВ-Петербург, 2010. – 336 с.

4. Захарова, И. Г. Информационные технологии в образовании : учеб. для студентов учреждений высш. проф. образования / И. Г. Захарова. – 8-е изд., перераб. и доп. – М. : Академия, 2013. – 208 с.

5. Информационные технологии : учебник / Ю. Ю. Громов [и др.]. – Тамбов : Тамбов. гос. техн. ун-т, 2015. – 260 с.

6. Контуры цифровой реальности. Гуманитарно-технологическая революция и выбор будущего / под ред. В. В. Иванова [и др.]. – М. : ЛЕНАНД, 2018. – 344 с.

7. Концепция информатизации системы образования Республики Беларусь на период до 2020 года [Электронный ресурс] // Министерство образования Республики Беларусь. – Режим доступа: https://edu.gov.by/statistics/informatizatsiya-obrazovaniya/. – Дата доступа: 29.05.2023.

8. «Облачная» концепция информатизации системы образования Республики Беларусь / С. В. Абламейко [и др.] // Информатизация образования. – 2012. – № 3. – С. 13–29.

9. Раицкая, Л. К. Soft skills в представлении преподавателей и студентов российских университетов в контексте мирового опыта / Л. К. Раицкая, Е. В. Тихонова // Вестн. Рос. у-та дружбы народов. Сер.: Психология и педагогика. – 2018. – Т. 15, № 3. – С. 350–363.

10. Сиренко, С. Н. Информатика. Практикум на основе междисциплинарных заданий с элементами моделирования и синергетики : учеб.-метод. пособие / С. Н. Сиренко. – Минск : Респ. ин-т. высш. шк., 2015. – 186 с.

11. Сиренко, С. Н. Образовательная парадигма цифровой эпохи [Электронный ресурс] / С. Н. Сиренко // Проектирование будущего.

Проблемы цифровой реальности : тр. I междунар. конф., Москва, 8–9 февр. 2018 г. / Ин-т прикладной математики, Рос. акад. наук. – Режим доступа: https://keldysh.ru/future/2018/7.pdf. – Дата доступа: 30.05.2023.

12. Уваров, А. Ю. Зачем нам эти МУКи / А. Ю. Уваров // Информатика и образование. – 2015. – № 9. – С. 3–17.

13. Фрумин, И. Д. Универсальные компетентности и новая грамотность: чему учить сегодня для успеха завтра. Предварительные выводы международного доклада о тенденциях трансформации школьного образования / И. Д. Фрумин, М. С. Добрякова, К. А. Баранников. – М. : Высш. шк. экономики, 2018. – 28 с.

14. Schleicher, A. What knowledge, skills, attitudes and values will today's students need to thrive and shape their world [Electronic resource] / A. Schleicher // SlideShare. – Mode of access: https://www.slideshare.net/OECDEDU/what-knowledge-skills-attitudes-and-values-will-todays-students-need-to-thrive-and-shape-their-world. – Date of access: 30.05.2023.

Diagnostics of the learning outcomes of educational activities

To diagnose the formation of master students' competences the following forms and means can be used: solving problem situations, solving competence-based and problem tasks, a report on the implementation of practical assignments, group discussion (including online, forum format), solving problems using computer models, independent design of educational assignments and tasks, fulfilling and presenting projects, etc.

Requirements for the implementation of diagnostics. The procedure of diagnosing the formation of a master student's competences includes the following stages: identifying the object of diagnostics; revealing the fact of a master student's educational achievements using the diagnostic tools presented above; measuring and assessing the degree of compliance of the master student's educational achievements with the requirements of the educational standard.

The main **methods and technologies of teaching** that adequately meet the goals and objectives of studying this discipline are: 1) methods of problem-based, heuristic learning (problem statement, partial search and research methods, heuristic conversation, etc.); 2) personality-oriented (developmental) technologies based on active (reflexive-activity) forms and methods of teaching (case method, project method, business, role and imitation games, discussion, educational debate, round table, etc.); 3) collective forms and methods of teaching (work in teams, pairs; techniques of collective analysis and reflection (Cartesian coordinates, SWOT, PEST, etc.)); 4) information and communication technologies that ensure the problem-research nature of the learning process and the activation of students' independent work (an inverted lesson, electronic presentations, the use of audio and video support for training sessions (analysis of audio, video situations, etc.), development and application based on computer and multimedia means of competence (or heuristic) tasks and creative tasks, supplementing traditional training sessions with means of interaction based on network communication capabilities (Internet forum, etc.)).

Credit questions

1. The fourth technological revolution and its impact on the social, economic and educational spheres.

2. Educational challenges of the technological revolution, the concept of advanced education.

3. Comparative characteristics of educational policies in the field of advanced education in Western countries, Russia and Belarus. The concept of the humanitarian and technological revolution.

4. Features of socialization of the individual in the digital era. Results of sociological surveys, including PISA, on the time students spend in the virtual space and their preferred content.

5. New (cross-cutting) competences associated with the digital revolution: soft skills, computation thinking, design thinking.

6. Factors and conditions for successful informatization of education in Belarus.

7. Information technologies that are successfully used in the educational process in Belarus and abroad.

8. The teacher as the most important component of the success of transition of Belarus to a digital society.

9. Digital transformation of the educational process: the essence and conditions of efficiency, differences from informatization.

10. Information educational resources of the Republic of Belarus. Requirements and recommendations for the official websites of education institutions.

11. The essence of the projects "E-School" and "Smart City" and the corresponding activities.

12. Services E-Register" and "E-Diary".

13. Corporate email. Electronic student card. Hygienic requirements for the organization of the educational process using ICT.

14. Impact of information and communication technologies (ICT) on changing approaches to the development of educational materials.

15. Improvement of teaching methods based on a combination of didactic and computer technologies; interaction between students and teachers via the Internet (E-Learning).

16. Control and assessment based on ICT. Informatization in the field of educational management.

17. Distance and blended learning: forms of implementation at school and university. Opportunities for effective use and limitations in a general education school and institution of higher education.

18. Learning management systems (for example Moodle or Google Classroom). Choosing an individual educational trajectory for a student.

19. New opportunities for digital technologies for interactive learning: cloud services for collaboration and communication;

20. New possibilities of digital technologies for complex data analysis; visualization in teaching; computer experiment and modelling.

21. Development of competences of the XXI century by means of education. The influence of social networks and computer games on education and personality development.

22. Media security. Information and media competence.

23. Using opportunities for digital interaction in order to improve the efficiency of educational work.

24. International experience of organizing project education in different countries of the world. The essence of STEM, STEAM approach to teaching.

25. Online resources and services for organizing project and research activities of schoolchildren and students.

INTERDISCIPLINARY COMPLIANCE OF THE ACADEMIC PROGRAMME

The educational discipline to be complied with	Department	Proposals for changes in the content of the academic programme in the educational discipline	The decision made by the Department that has developed the academic programme (with the date and the minutes number)
Management of the Education Institution	Pedagogy Department	No proposals	Minutes No. ___ as of _____
Diagnostics of the Effectiveness of Management Process	Pedagogy Department	No proposals	Minutes No. _____ as of _____