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B.T. Seitkhanova, G.N.Nuralieva, L.H.Niyazmetova

FUNDAMENTALS OF PROJECT ACTIVITY

(Educational and Methodological Manual for Bachelor's Degree Programs in the Field of Education 6B10 – "Healthcare")

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Authors' Team:

Faculty members of the Department of Microbiology, Allergology and Immunology, JSC South Kazakhstan Medical Academy:

B.T. Seitkhanova – Doctor of Medical Sciences, Professor, Head of the Department.
G.N.Nuralieva – Master's degree holder, Senior Lecturer.
L.H.Niyazmetova – Teacher.

Reviewers:

Internal reviewers:

A.Sh. Sadykova – JSC South Kazakhstan Medical Academy, Doctor of Medical Sciences, Acting Professor.

External reviewer:

B.B. Bizhigitova – KazNMU named after S.D. Asfendiyarov, c.m.s., associate professor.
F.K. Khallokov – Bukhara State Medical Institute named after Abu Ali ibn Sino, Head of the Department of Engineering, Biophysics and Informatics, PhD, Associate Professor.

Fundamentals of Project Activity:

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The presented educational and methodological manual is intended for bachelor's degree students studying the discipline **"**Project Activity". The manual aims to provide learning materials that introduce students to the fundamentals, principles, and methodologies of project-based activity.

During the learning process, students acquire skills in planning, implementing, monitoring, and evaluating medical projects, as well as enhance their research competencies.

The manual encourages learners to apply innovative solutions in project activities and to develop teamwork skills. It represents a valuable resource for all participants involved in the medical education process.

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LIST OF ABBREVIATIONS

DNA – Deoxyribonucleic Acid
HEI – Higher Education Institution
LAIC – Library and Information Center
CT – Computed Tomography
MRI – Magnetic Resonance Imaging
SKMA – South Kazakhstan Medical Academy
RMEL – Republican Inter-University Electronic Library
RNA – Ribonucleic Acid
US – Ultrasound Examination
EHC-Electronic Health Cards

KEY TERMS AND CONCEPTS

Project – a system of interrelated activities carried out within a defined period of time in order to achieve a specific goal. The project outcome is expressed in the form of a new product, service, method, or scientific conclusion.

Project activity – a set of actions related to the development, planning, implementation, monitoring, and evaluation of a project. This activity is aimed at developing learners' research and practical skills.

Project management – a management process that ensures the effective implementation of a project. It includes resource allocation, time planning, risk management, coordination of teamwork, and control.

Project goal – a clearly defined expected result that describes the final outcome of the project. The goal is most often formulated according to the SMART principle.

SMART principle – a model for proper goal formulation:

S – Specific

M – Measurable

A – Achievable

R – Relevant

T – Time-bound

SWOT analysis – a method used to assess the internal and external environment of a project. It includes strengths, weaknesses, opportunities, and threats.

Risk – uncertainty or a condition that may negatively affect project implementation. Risks may be financial, organizational, technical, or ethical.

Risk management – the process of identifying, assessing, and planning preventive measures to mitigate potential risks.

Key Performance Indicators (KPIs) – quantitative or qualitative indicators used to evaluate the effectiveness of a project.

Gantt chart – a graphical tool used for time-based project planning. The start and end dates of each task are visually represented on the chart.

Project phases – the main stages of project development:

- problem identification;
- planning;
- implementation;
- monitoring and control;
- evaluation and completion.

Monitoring – the systematic tracking of project progress and verification of its compliance with the plan.

Evaluation – the analysis of project outcomes in relation to set goals and the determination of project effectiveness.

Resources – material, financial, human, informational, and technical capacities required for project implementation.

Communication plan – a document that defines the procedures, methods, and responsible persons for information exchange among project participants.

Stakeholders – individuals or organizations that have a direct or indirect interest in the project (teachers, students, clinical bases, administration, patients).

Project team – a group of individuals directly involved in project implementation. The roles and responsibilities of team members are defined in advance.

Innovation – a new method, technology, or solution that improves or completely transforms existing practices.

Research project – a planned and conducted scientific and practical activity aimed at answering a research question or testing a hypothesis.

Ethical principles – norms that must be observed when conducting medical projects, including respect for human rights, confidentiality, informed consent, non-maleficence, and justice.

Medical project – a project activity aimed at improving diagnostic, therapeutic, educational, or managerial processes in the healthcare sector.

Project-Based Learning (PBL) – a pedagogical approach focused on learning through project activities, representing a model of experiential learning.

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PREFACE

1. Type of Publication and Its Place in the Curriculum

This publication is an Educational and Methodological Manual designed for bachelor's degree students enrolled in healthcare education programs at higher education institutions of the Republic of Kazakhstan. It was developed by faculty members of the Department of Microbiology, Allergology and Immunology of JSC South Kazakhstan Medical Academy.

Within the overall healthcare bachelor's curriculum, the discipline "Fundamentals of Project Activity" occupies an integrative position: it bridges purely theoretical biomedical disciplines studied in earlier semesters with the research, clinical, and managerial competencies required in advanced years of study and in subsequent professional practice. Mastery of this discipline directly prepares students for thesis work, research electives, clinical rotations, and lifelong evidence-based practice.

2. Level and Target Audience

The manual is intended for second year bachelor's degree students (undergraduate level) pursuing the qualification of physician / healthcare specialist in programs accredited under the «Healthcare» field of training in Kazakhstan. It is equally applicable as a supplementary resource for master's degree students (magistracy) and residents seeking to strengthen their project-management and research-design competencies.

3. Purpose and Expected Learning Outcomes

The primary purpose of this manual is to equip future healthcare professionals with the theoretical foundations, practical tools, and ethical framework needed to plan, implement, monitor, evaluate, and present medical projects in compliance with current national and international standards.

Upon successful completion of the discipline, students will be able to:

- Explain the conceptual and theoretical basis of project-based activity, including its key definitions, principles, and phases.
- Apply the SMART principle and SWOT analysis to formulate a well-defined project goal and critically assess the project environment.
- Develop a comprehensive project plan, including a work-breakdown structure, Gantt chart, communication plan, risk register, and budget.
- Conduct research projects in medicine using quantitative, qualitative, and mixed-methods approaches, while adhering to ethical principles (informed consent, confidentiality, beneficence, justice).
- Use digital tools (Trello, Canva, Google Forms, SPSS) for project management, data collection, analysis, and visual presentation.
- Evaluate project effectiveness using Key Performance Indicators (KPI) and standardized assessment rubrics.
- Present project results to professional audiences in written and oral formats, including academic reports and conference presentations.

4. Prerequisites (Pre-requisite Disciplines)

- Before enrolling in the discipline "Fundamentals of Project Activity," students are expected to have successfully completed or be concurrently studying the following disciplines:
- Microbiology, Virology, and Immunology – foundational scientific knowledge relevant to medical research projects.
- Biostatistics and Medical Informatics – quantitative reasoning, data handling, and basic statistical analysis.
- Medical Biology and Genetics – understanding of biological principles underlying clinical research.
- Philosophy and Research Methodology (General) – basic principles of scientific inquiry and academic writing.
- Kazakh / Russian / English languages – academic literacy required for documentation, reporting, and literature review.

5. Methodological Guidance for Studying the Discipline

The manual is structured into three sequential chapters mirroring the logical progression of project activity: from conceptual organization (Chapter 1), through scientific research design (Chapter 2), to evaluation and quality assessment (Chapter 3). Students are advised to:

1. Read each chapter in the sequence presented, as later chapters build on concepts introduced earlier.
2. Study the Key Terms and Concepts section at the beginning of the book before starting Chapter 1; consult it as a reference throughout.
3. Attempt the Case-Based Tasks at the end of each chapter independently before reviewing model answers; these tasks simulate real clinical project scenarios and develop decision-making skills.
4. Complete the Test Questions at the end of the manual to self-assess knowledge across all three chapters.
5. Work actively with Appendices 1–4, which contain practical templates, rubrics, and reference forms for project documentation.
6. Form study groups of 3–5 students to simulate the teamwork dynamics inherent in real medical project implementation.
7. Maintain a personal project portfolio throughout the semester, documenting each stage of a self-chosen mini-project using the tools and templates described in the manual.

6. Recommendations for Working with Additional Information Sources

The reference list at the end of the manual includes peer-reviewed monographs, evidence-based guidelines, and authoritative online resources. Students are encouraged to:

- Use the Republican Inter-University Electronic Library (RIEL) and the SKMA Library and Information Center (LAIC) to access full texts of cited sources.
- Consult WHO and OECD digital health publications (freely available at who.int and oecd.org) for current global frameworks on health project management.

• Explore the Cochrane Library (cochranelibrary.com) for systematic reviews relevant to research project design.

• Use Google Scholar, PubMed, and Cyberleninka for searching peer-reviewed literature on specific project topics.

• Verify all online sources against the date of publication; prefer sources published within the last 5 years, unless a seminal older work is specifically cited.

• Apply critical appraisal skills (learned in Chapter 2) when evaluating the quality of external information sources.

7. Features and Rules for Using the Publication Apparatus

The manual employs the following editorial and navigational apparatus to support independent learning:

1. Key Terms and Concepts – a glossary placed at the beginning of the manual defines all major terminology used throughout the text. Terms appearing in the glossary are bolded on their first occurrence in each chapter.

2. List of Abbreviations – located immediately before the glossary; consult this list whenever an unfamiliar acronym is encountered.

3. Chapter Keywords – each chapter opens with a concise list of keywords summarizing the core concepts covered; these keywords may be used as search terms when consulting additional sources.

4. Learning Objectives – each chapter states explicit learning objectives aligned with the standard syllabus of the discipline, enabling students to self-assess their mastery before and after study.

5. Goal-Achievement Algorithm – a step-by-step algorithm following the learning objectives guides the student through the recommended sequence of study activities for each chapter.

6. Case-Based Tasks – practical situational tasks at the end of each chapter require application of chapter knowledge to realistic medical project scenarios.

7. Numbered References – all in-text citations are provided as numbered footnotes [1], [2], …, with full bibliographic details in the References section. Hyperlinks to open-access sources are embedded in the reference list for direct access.

INTRODUCTION

At present, the field of medicine is undergoing complex and dynamic changes. New technologies, scientific research, and innovative methods play a significant role in improving the quality of medical services. In this context, it is essential for learners to master project-based activities and to be able to apply them in practice.

Project-based activity represents a system of actions aimed at achieving a specific goal and solving a particular problem. Through project work, learners not only acquire theoretical knowledge but also develop skills to apply it in real practice. The main objective of this activity is to foster creative thinking, enhance learners' ability to solve problem situations, conduct research, and analyze the results obtained.

The essence of project-based learning lies in its focus on solving a specific problem, deepening practical knowledge, and developing teamwork and professional collaboration skills. In the field of medicine, such a problem may involve complex clinical situations, issues related to improving public health, or conducting scientific research. Each project provides learners with the opportunity to develop an action plan aimed at finding a concrete solution.

During the implementation of a project, learners apply their theoretical knowledge in practice. This contributes to a deeper understanding of the subject, as well as the development of experience in working with patients, conducting research, and selecting effective diagnostic and treatment methods.

Many medical projects are carried out in a group format. Learners interact with one another and with specialists from related fields, recognizing that the success of a project depends on proper role distribution and the quality of coordinated teamwork.

The importance of project-based learning lies in the development of professional skills, the formation of research abilities, the enhancement of decision-making competence, as well as the strengthening of responsibility and the capacity for self-development [1].

In the medical field, project-based learning helps students develop essential skills such as working with patients, establishing a diagnosis, creating a treatment plan, collecting and analyzing information, and using medical equipment.

Project-based learning also enables the improvement of research skills. Students master scientific methods, learn how to conduct research, and analyze its results. This forms the foundation for future scientific advancements in the medical field.

The ability of learners to make decisions is a key component of project-based learning. Evaluating various situations and developing effective solutions within a project plays an important role in the professional training of future physicians.

During the implementation of projects, learners experience a high level of responsibility. Each project serves as an indicator of their level of preparedness, motivating them to complete the assigned tasks with high quality. This contributes to the development of self-directed learning skills and personal growth.

In the medical field, project-based learning aims to enhance the professional readiness of future physicians and healthcare workers, as well as to integrate theoretical knowledge with practical skills.

In medical education, it is not sufficient to acquire theoretical knowledge solely from textbooks. Learners must be able to apply the knowledge gained in real clinical situations. The project-based learning methodology provides such an opportunity, enabling students to put their knowledge into practice through specific tasks related to disease diagnosis, treatment planning, and conducting research activities. This approach contributes to the formation of a confident and competent specialist prepared for professional practice.

Another important feature of project-based learning in medicine is the modeling of real clinical situations. Students are given tasks that include analyzing a patient's condition, making an accurate diagnosis, selecting appropriate treatment methods, and monitoring the patient. Such situational tasks promote the development of clinical reasoning, rapid decision-making skills, and the ability to work effectively under conditions of uncertainty.

In many cases, the provision of medical care to a patient is carried out through the collaborative work of several specialists. During project-based learning, students work in groups, exchange information with their peers, and interact with professionals in various medical fields (such as surgeons, therapists, and radiologists), making decisions collectively. This helps learners understand the importance of teamwork in medicine and develop professional competencies in collaborative practice.

Ethical issues hold a particularly important place in the field of medicine. Throughout project-based learning, students acquire moral and ethical norms related to patient care. Understanding that every decision, treatment method, or recommendation directly affects a patient's life fosters a high level of responsibility in future physicians. Project-based activities help students develop essential competencies such as protecting patient rights, maintaining confidentiality, and adhering to professional ethical standards.

Medicine is a constantly evolving science, and every physician must seek new information and engage in research. The project-based learning methodology promotes the development of research skills, including data collection and analysis, drawing evidence-based conclusions, and interpreting results. These skills are especially important for mastering medical innovations and new treatment approaches.

Modern medicine is closely connected with digital and innovative technologies. Within project-based learning, it is essential to teach students how to use medical information systems, artificial intelligence, and other advanced tools. This prepares future specialists to work with medical technologies and to apply innovative solutions in clinical practice.

Project-based learning in medical education helps students develop the ability to apply a comprehensive approach to patient care. Students consider not only the treatment of a specific disease but also take into account the patient's overall health status, lifestyle, and psychological condition, which allows for the development of more effective and holistic treatment strategies. Such an approach promotes the formation of a *holistic* perception of the patient and the creation of an integrated therapy plan.

The discipline “Project-Based Activity” is aimed at developing students’ skills in conducting scientific research, planning, implementing, and evaluating medical projects. Throughout the course, students learn modern project management methods, including *SWOT* and *SMART* analyses, and acquire practical skills in using platforms such as Trello and *Canva*, creating surveys in *Google Forms*, and analyzing the collected data.

The main objective of this educational and methodological guide is to familiarize students with the theoretical foundations, practical competencies, and ethical aspects of project-based activity. The guide is designed to provide a detailed review of each stage of a project, address issues that may arise during its implementation, and strengthen the connection between research activities and clinical practice in medicine.

Mastering project-based activities contributes to the development of students’ scientific outlook, creative abilities, and teamwork skills. In addition, project-based learning supports the effective implementation of new ideas and solutions, as well as the improvement of practical competencies in medical education.

We invite you to explore the fascinating and rewarding world of project-based learning. We are confident that the knowledge and skills you acquire during the educational process will enable you to succeed in your future medical practice, contribute to strengthening public health, and achieve significant results in the fields of science and education.

Chapter 1. ORGANIZATION OF PROJECT-BASED ACTIVITY

Keywords

project, project activity, project management, project goal, SMART principle, SWOT analysis, project phases, planning, Gantt chart, work breakdown structure (WBS), stakeholders, project team, risk, resource allocation, communication plan, monitoring, milestones, innovation, project-based learning (PBL), medical project

Learning Objectives

By the end of Chapter 1, the student will be able to:

1. Define the concept of a "project" and distinguish it from routine operational activities in a healthcare organization.
2. List and describe the main phases of a project lifecycle (problem identification → planning → implementation → monitoring and control → evaluation and completion).
3. Apply the SMART principle to formulate a measurable and achievable project goal for a medical context.
4. Conduct a SWOT analysis to assess the internal and external environment of a proposed medical project.
5. Construct a project Gantt chart and a team responsibility distribution matrix (RACI matrix).
6. Identify key stakeholders of a medical project and develop a communication plan for effective information exchange.
7. Describe the role of digital tools (Trello, Canva, Google Forms) in the organization of project activity.
8. Explain the principles of risk identification and risk management in the context of a healthcare project.

Algorithm for Achieving Learning Objectives

Follow the steps below sequentially to master the material of Chapter 1:

Step 1 – Activate prior knowledge

Before reading, answer the following questions in writing: (a) What is the difference between a project and a plan? (b) Have you ever participated in any group project? What challenges arose?

Step 2 – Study Section 1.1 "What Is a Project?"

Read the section carefully. After reading, write your own definition of a project in 2–3 sentences using your own words. Compare your definition to the one in the Key Terms glossary and note any differences.

Step 3 – Study Section 1.2 "Main Stages of a Project"

Read each subsection of 1.2 (goal formulation, planning, implementation, monitoring, evaluation). For each stage, fill in a summary table: Stage | Key Actions | Tools Used | Responsible Person. Use the SMART and SWOT frameworks to practice goal formulation with a sample problem provided in the text.

Step 4 – Study Section 1.3 "Tools and Methods of Project Activity"

Explore the digital tools described (Trello, Canva, Google Forms). If internet access is available, register for free accounts and perform the introductory tutorials for each platform. Alternatively, study the screenshots and examples provided in Appendix 1.

Step 5 – Practice: Construct a Gantt chart and responsibility matrix

Choose a simple medical project topic (e.g., "Prevention of Influenza Among First-Year Students"). Draft a project plan including: SMART goal, SWOT analysis, list of tasks, Gantt chart for a 3-month timeline, and a responsibility distribution matrix using the template in Appendix 2.

Step 6 – Solve Case-Based Tasks

Complete the Case-Based Tasks at the end of Chapter 1 independently. Compare your answers with group members and discuss discrepancies.

Step 7 – Self-assessment

Return to the Learning Objectives list above. For each objective, rate your confidence on a scale of 1–3 (1 = cannot perform; 2 = can perform with assistance; 3 = can perform independently). For any objective rated 1 or 2, re-read the corresponding section before proceeding to Chapter 2.

The organization of project-based activity is an important stage that involves the effective management of resources, processes, and participants in order to achieve a specific goal. This process includes the development of an appropriate structure, planning, and communication system that ensures the successful implementation of the project.

1.1. WHAT IS A PROJECT?

A project is a temporary and systematic set of activities aimed at achieving a specific goal. The main purpose of a project is to solve a particular problem or to create a new product, service, or research outcome. In the medical field, a project enables learners not only to acquire theoretical knowledge but also to develop new practical skills through direct application. A project is based on defined time frames, clear goals and objectives, expected outcomes, available resources, and teamwork.

Every project has a specific start and finish time. A project is temporary in nature, meaning it must be implemented within a set period and completed with a tangible result.

A project is directed toward achieving a particular goal and includes a number of tasks necessary for its realization. In medical projects, the goal may involve studying a specific disease, developing a treatment method, or solving a clinical case. Each project is oriented toward producing a concrete outcome. Such an outcome may be a new medical approach, scientific research findings, or an improvement in the quality of healthcare services.

The implementation of a project requires limited resources such as time, financial support, and human resources. Effective management of these resources is a key factor in ensuring the success of the project.

Most projects are carried out with the participation of several individuals. Each participant has specific roles and responsibilities. In medical projects, the team may include physicians, researchers, nurses, and other healthcare professionals.

Specific Features of Projects in the Field of Medicine. In the medical field, projects are typically aimed at conducting scientific research, developing innovative technologies, improving patient treatment methods, or enhancing the healthcare system. Projects may focus on solving a clinical problem or testing new therapeutic approaches. Their implementation contributes to improving patients' quality of life, preventing diseases, and strengthening public health.

Possible project topics for students may include: developing a new diagnostic method for a disease; projects aimed at improving public health (vaccination, infection prevention); research projects (studying the effectiveness of a specific medication) [2].

Project-based learning provides students not only with theoretical knowledge but also with the opportunity to reinforce it through practice, while fostering the development of independent decision-making skills.

1.2. MAIN STAGES OF A PROJECT

For the successful implementation of a project, it is important to divide it into specific stages and carry them out sequentially. Each stage includes concrete tasks and defines the necessary steps required to achieve the project's objectives. In the medical field, these stages may encompass various clinical and research activities. The main stages of a project are described as follows:

Defining the Project Goal and Formulating the Problem

At this stage, the core problem underlying the project is identified. In medicine, a specific issue or question requiring a solution is determined. First, the problem itself is formulated, and then the primary goal of the project is established. Defining the goal and formulating the problem are key steps that ensure the successful implementation of the project. These steps provide direction for the project and play a crucial role in achieving the desired outcome.

The project goal is a set of specific and measurable outcomes that must be achieved upon completion of the project. This goal unifies all stages of the project and directs the efforts of the team in the right direction.

One of the key principles for defining a project goal is the *SMART principle*. According to this principle, the project goal should be specific, measurable, achievable, relevant, and time-bound.

The goal must be clear and specific, meaning it should be evident why it is necessary (*Specific*).

It is important to establish indicators that allow the measurement of progress toward achieving the goal (*Measurable*).

The goal must be realistic and achievable with the available resources (*Achievable*).

The goal should be aligned with the strategic objectives of the project and the organization as a whole (*Relevant*).

The goal must be achievable within a defined timeframe (*Time-bound*). For example: “The goal of the project is to establish new microbiological laboratories and train staff within six months to strengthen infection control in hospitals.”

Correct problem identification is the foundation of project planning, as the goals and objectives are formed based on the identified problem. A problem is a specific difficulty or obstacle that requires a solution; its formulation allows the project goal to be defined. At the first stage, it is necessary to determine the essence of the problem. It is important to fully understand the problem and identify the specific challenges it creates. At this stage, the causes of the problem and its consequences are examined in detail.

The problem can be clarified by asking guiding questions, such as: What is the problem related to? Where did it arise? What factors influence its development? and others.

The assessment of the problem’s significance is based on analyzing its impact on the project or organization, which allows determining its level of importance.

To clarify the causes of the problem and identify possible solutions, it is necessary to collect relevant data. This information provides insights into the scope of the problem and its consequences.

After that, the problem should be formulated clearly and concretely. The wording must be brief, clear, and precise. A clearly defined problem becomes the basis for establishing the project goal and determines the further direction of the work. For example: “The insufficient level of infection control in medical organizations leads to an increased risk of disease transmission.”

Correct problem formulation and goal setting enable the project team to clearly understand the direction of their work and focus on achieving specific results. Well-formulated goals and problems help ensure effective decision-making at all stages of project implementation.

Planning Stage

After the project goals have been defined, a detailed plan for their implementation is developed. The planning stage is one of the most important phases, as it guides the execution of the project and ensures its successful completion. At this stage, the organization of all necessary tasks, as well as the allocation of resources and time, is determined. Learners decide which research methods they will use and which tools they will apply. Responsibilities of project participants are assigned, and the role of each team member is clarified. In group projects, the specific tasks and responsibilities of each student are defined (Table 1).

Planning begins with a detailed analysis of the project's goals and objectives. During this stage, the main goal of the project is formulated, and the tasks required to

achieve it are identified. The significance of each task and its contribution to the overall goal of the project are also evaluated [3].

Table 1. Project Responsibilities Distribution Matrix

Project Participant / Type of Project Work	Ibraim A.Y	Oralbek A.T.	Tlesh A.A.	Praliyev a K.Y
Project plan development				
Collection of empirical data				
Collection of literature sources				
Conducting a sociological survey				
.....				
Preparation of the written project report				
Creation of the project presentation				
Project defense				

Defining the scope of the project makes it possible to determine which types of work are included in the project and which are not. This helps clearly outline the list of activities that must be carried out within the project framework and prevent the execution of tasks that fall outside its boundaries, thereby avoiding unnecessary time and resource expenditures. As a result, the sequence of each task and the expected project outcomes become clear.

Dividing the project into stages with specific time frames is highly important. During time planning, a detailed schedule is developed for each task. Using tools such as Gantt charts, a project timeline is created, and the duration of each stage is determined. Key phases (*milestones*) are identified, which enables effective monitoring of the project's progress.

The Gantt chart is a visual tool widely used in project planning that illustrates the timeframes for completing each project task. This chart allows a project to be displayed step by step over time and enables monitoring of the duration of each phase. On the chart, horizontal lines (*bars*) represent the start and end times of tasks.

The main elements of a Gantt chart include a list of tasks, a time scale, bars (*horizontal lines*), key milestones, and dependencies. On the left side of the chart, all project tasks and phases are presented in a list format. The upper part of the chart displays the time scale by days, weeks, months, or years. Each bar represents the duration of a specific task. The longer the bar, the more time is required to complete the task. Important project points or task completion deadlines are highlighted separately. These milestones represent major achievements or significant results during the project implementation. Some tasks may depend on the completion of

other tasks. Dependent tasks are shown in such a way that their start or completion times are linked to preceding tasks.

The advantages of the Gantt chart include clarity, effective time management, and the ability to monitor task dependencies and overall project progress. The project structure and the timeline of each task are presented visually, making it easier for the team to understand the workflow. Using the bars, one can see the duration of each phase and the planned deadlines, which helps ensure timely project completion. The Gantt chart also allows identification of interdependencies between tasks and tracking of how one task affects another. By entering actual results into the chart, it becomes easy to compare project progress with the original plan.

The construction of a Gantt chart involves preparing a list of tasks, determining task durations and dependencies, creating the chart, and performing ongoing monitoring and updates. All project tasks must be included in the task list. Each task should be clearly defined and oriented toward achieving the project objectives. The execution timeframe for each task must be specified. Some tasks may be carried out only after the completion of others; therefore, it is necessary to identify dependencies between tasks. For each task, a corresponding bar is placed on the time scale to indicate its start and end dates. During project implementation, the Gantt chart should be regularly updated, and actual results should be compared with the planned schedule [4].

As an example, a microbiological research project can be considered. In this case, the Gantt chart may appear as follows (Table 2).

Table 2. Gantt Chart

GANTT CHART: TEMPLATE

GANTT CHART: TEMPLATE

Project Title:		Probiotics and Intestinal Microflora				
Project Manager:		Ainabek Ayaulym				
№	**Task Name**	**Responsible Person**	**Start Date**	**End Date**	**Duration**	**Completion Percentage**
1	**Project Development**					
1.1	Development of the Project Charter	Ainabek Ayaulym	04.11.24	06.11.24	2	100%
1.1.1	Amendments to the Charter	Myrzabay Ulsezim	04.11.24	06.11.24	2	100%
1.2	Research	Raushanbek Zhanerke	04.11.24	06.11.24	2	100%
1.3	Planning	Temirbay Nazerke	04.11.24	06.11.24	2	100%

2	**Project Planning**					
2.1	Definition of Scope and Objectives	Ainabek Ayaulym	04.11.24	06.11.24	2	100%
2.2	Budgeting	Myrzabay Ulsezim	04.11.24	06.11.24	2	100%
2.3	Development of the Communication Plan	Raushanbek Zhanerke	04.11.24	06.11.24	2	100%
2.4	Risk Management	Temirbay Nazerke	04.11.24	06.11.24	2	100%
3	**Project Launch and Implementation**					
3.1	Status Monitoring	Ainabek Ayaulym	04.11.24	06.11.24	2	100%
3.2	Definition of Key Performance Indicators (KPIs)	Myrzabay Ulsezim	04.11.24	06.11.24	2	100%
3.2.1	Quality Control	Raushanbek Zhanerke	04.11.24	06.11.24	2	100%
3.2.2	Forecasting	Temirbay Nazerke	04.11.24	06.11.24	2	100%
4	**Project Completion**					
4.1	Project Objectives	Ainabek Ayaulym	04.11.24	06.11.24	2	100%
4.2	Final Deliverables	Myrzabay Ulsezim	04.11.24	06.11.24	2	100%
4.3	Cost Evaluation	Raushanbek Zhanerke	04.11.24	06.11.24	2	100%
4.4	Performance Evaluation	Temirbay Nazerke	04.11.24	06.11.24	2	100%

For each task of this project, specific start and end dates are defined, allowing the project team to clearly understand which activities should be performed and in what sequence. Currently, various tools and software are used to create Gantt charts, including:

- **Microsoft Project** — a professional tool designed for managing complex projects;
- **Excel** — enables the creation of simple Gantt charts;
- **Trello** — convenient for project management and task allocation;
- **Asana, Monday.com** — online platforms for project management.

The use of a Gantt chart simplifies project management and increases the efficiency of time and resource utilization.

For the successful implementation of a project, accurate resource planning is essential. Resource planning involves calculating the required human, equipment, financial, and material resources. It is determined which resources are available and

which need to be obtained externally. Delivery timelines and costs of resources are taken into account, after which a resource allocation plan is developed.

The budget defines the financial requirements of the project and helps calculate each category of expenditure. At this stage, the amount of funding allocated to each phase of the project is determined. Financial costs are calculated, and a contingency reserve is established for unforeseen circumstances. The project's financial plan is approved, which facilitates financial control throughout project execution.

Assessing potential risks that may arise during project implementation in advance is critically important. In risk management, possible risks and their likelihood are analyzed. The potential impact of each risk on the project is identified, and mitigation measures are planned. A risk response plan is developed, helping to overcome obstacles that may occur during the project lifecycle [5].

The communication plan is designed to organize interaction and information exchange within the project team. Methods and frequency of communication among project participants are defined. Responsibilities for specific information and the channels through which information will be disseminated are determined. This plan ensures structured information flow and helps prevent misunderstandings during project implementation.

Project quality requirements are defined, and plans are made to monitor their fulfillment. During the project, quality indicators and evaluation criteria are established. A quality management system is developed to ensure that the project meets the specified requirements.

After all plans are developed, the project is formally approved by the project manager, team members, and stakeholders. At this stage, the plans are discussed and revised if necessary. The planned activities and their implementation schedule are officially approved.

The planning phase enables the precise and effective execution of all project activities. When a project is properly planned, all stages are completed on time and efficiently, and participants rely on a clear, structured plan focused on achieving the project objectives.

Data Collection and Analysis

Data collection and analysis represent a crucial stage in the successful implementation of a project. At this stage, the necessary information is gathered in accordance with the project objectives, and its relevance, effectiveness, and potential for application are evaluated through analysis. The data collection process includes clarifying objectives, identifying information sources, selecting appropriate methods, and collecting data. During data collection, the specific goals and needs of the problem under investigation are defined. When objectives are clearly formulated, the data collection process proceeds in a systematic and structured manner. Selecting reliable information sources that align with the project goals is essential. These sources may include scientific articles, academic literature, statistical data, interviews, questionnaires, laboratory data, and other relevant materials. Data collection methods depend on the type of project and are implemented using the

selected approaches. At this stage, all necessary data are accumulated, and care must be taken to avoid errors during data compilation and organization [6].

Reliable data are required for the successful execution of a project. This involves reviewing academic literature and scientific publications related to the project topic, as well as collecting statistical data. In the medical field, this may include clinical studies, laboratory tests, and data obtained from patients. By analyzing the collected data, key trends are identified and systematized in accordance with the project objectives. At this stage, statistical methods are applied to assess the accuracy and reliability of the data. In this context, the Library and Information Center of the South Kazakhstan Medical Academy (LIC) can be considered one of the leading units providing documentary and information support for the academy's educational process and scientific research, as well as a space that facilitates the formation of an intellectual environment for students and academic staff (Figure 1).

Figure 1. Library and Information Center of the South Kazakhstan Medical Academy (Source: https://lib.ukma.kz/)

]The main objectives of the library include its development as an information center providing high-quality services to all categories of users by ensuring access to its own and global information resources; expanding the range and improving the quality of library and information services; comprehensively addressing the organization of a unified library space within the academy and ensuring equal access to information resources for all user groups; developing an electronic library that includes the academic staff's publications, educational and teaching-methodological materials, as well as particularly valuable items from the library collection; and developing users' skills in working with both local and remote information resources.

The electronic resources of the Library and Information Center include:

- SKMA Electronic Library — **https://e-lib.skma.edu.kz/genres**

- Republican Interuniversity Electronic Library — **http://rmebrk.kz/**
- "Aknurpress" Digital Library — **https://www.aknurpress.kz/**
- "Epigraph" Electronic Library — **http://www.elib.kz/**
- Epigraph – Multimedia Textbook Portal — **https://mbook.kz/ru/index/**
- IPR SMART Electronic Library System — **https://www.iprbookshop.ru/auth**
- "Zan" Information and Legal System — **https://zan.kz/ru**
- Cochrane Library — **https://www.cochranelibrary.com/**

The Republican Interuniversity Electronic Library (RIEL) is aimed at creating a unified information system of educational resources that fully meets the needs of academic staff, students, master's students, doctoral students, and other participants in the educational process for modern information and educational resources. It facilitates the exchange of учебной literature, teaching and methodological complexes of disciplines, scientific articles, and reports on research and experimental development activities among higher education institutions; provides full-text test databases in remote access mode; and promotes integration with Kazakhstani and international information networks as part of the development of a unified information system (Figure 2).

Materials published on the network resources of the Republican Interuniversity Electronic Library, as well as the services provided by RIEL, are regarded as a means of accessing information for educational and scientific purposes in the digital environment in accordance with international copyright standards. When working with full-text electronic resources and internet resources of RIEL, it is necessary to strictly comply with the laws of the Republic of Kazakhstan "On Copyright and Related Rights" and "On Informatization," with mandatory indication of the author's and/or copyright holder's name, as well as the information source.

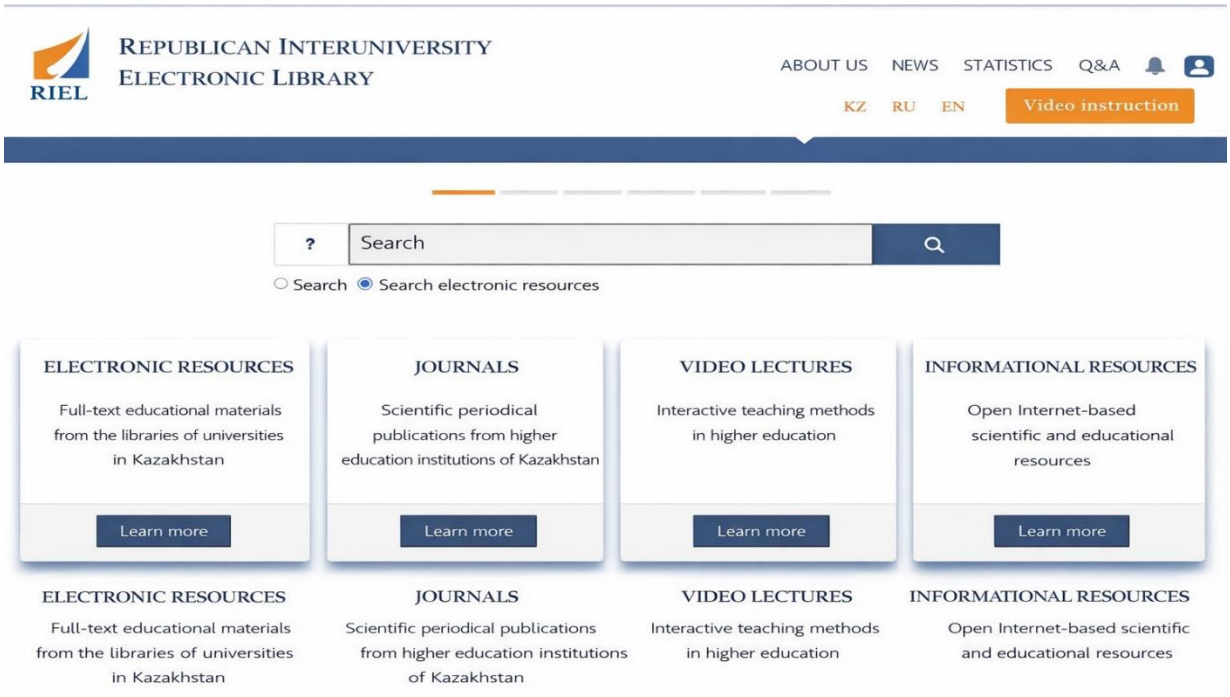

Figure 2. Web Page of the Republican Interuniversity Electronic Library
(Source: https://rmebrk.kz/)

Full access to the full-text resources of the electronic library is provided in the libraries of higher education institutions of the Republic of Kazakhstan that are members of the RIEL, as access is restricted to a specific range of IP addresses assigned to each participating university. Staff members, faculty, and students of RIEL member institutions who have a corporate email address of their organization may complete individual registration on the website in accordance with the terms of the User Agreement to gain access to the RIEL collections for viewing and learning purposes.

The **"Aknurpress" digital library** is a software-based platform that provides online access to a database of national digital textbooks and teaching and methodological complexes, supported by technical assistance and a call center (Figure 3). The library contains more than 2,000 titles of textbooks and teaching and methodological materials corresponding to the curricula of higher and secondary educational institutions of the Republic of Kazakhstan. The library is focused on supporting the educational process by providing users with modern learning materials in an interactive format. The platform allows users to download and read electronic textbooks in PDF or other convenient formats. The literature is available in Kazakh, Russian, and English. The library is updated daily and regularly supplemented with new publications. Remote access is provided after registration.

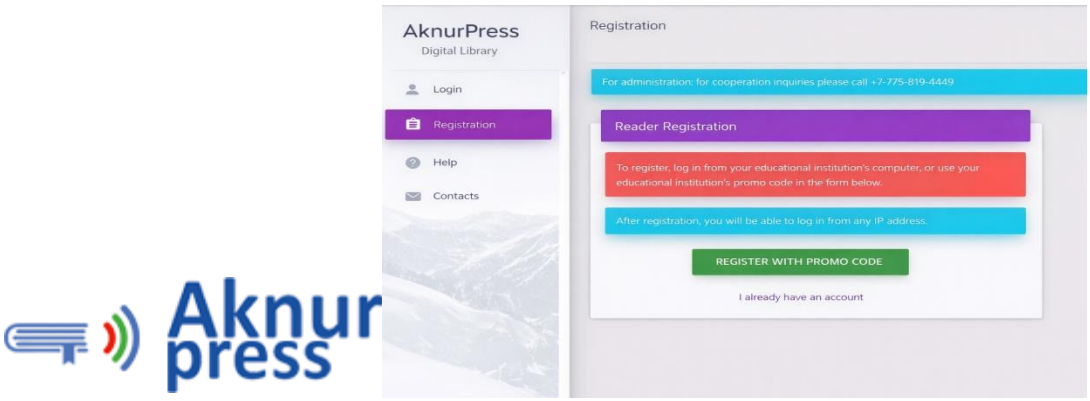

Figure 3. Web Page of the "Aknurpress" Digital Library
(Source: https://aknurpress.kz/)

The **"Epigraph" electronic library** is a widely used digital educational resource in Kazakhstan (Figure 4). This platform provides online access to educational literature, textbooks, research papers, methodological manuals, articles, and materials across various academic disciplines. It can be used by school students, university students, faculty members, as well as individuals interested in self-education. The Epigraph library offers a user-friendly interface, an efficient search system, and the ability to read materials in PDF format, which helps simplify and support the learning process.

Figure 4. Web Page of the "Epigraph" Electronic Library
(Source: http://www.elib.kz/)

The Epigraph company provides a portal of 24 multimedia textbooks that enable distance learning. The website is adapted for use on all mobile devices. A multimedia textbook is a set of software solutions that allows learners to access educational multimedia content that includes not only text but also interactive knowledge-assessment modules.

The multimedia textbook includes the main educational material presented in electronic form with search and navigation functions, as well as animated tables and graphs; animations—including statistical, dynamic 2D and 3D animations, interactive animations, and virtual laboratories; video lectures based on the textbook material, in which the author acts as an active participant in a virtual digital presentation; self-assessment tests presented as interactive pages; and tasks that include situational, computational, logical, and laboratory assignments.

At the South Kazakhstan Medical Academy, access to the **Cochrane Library database** has been provided, offering information and evidence to support decision-making in medicine and other areas of healthcare. This resource enables users to find information on clinical trials, Cochrane reviews, non-Cochrane systematic reviews, methodological studies, as well as technological and economic evaluations related to specific topics or diseases.

The Cochrane Database of Systematic Reviews (CDSR) is the world's leading collection of systematic reviews in the field of healthcare (Figure 5). The CDSR includes Cochrane systematic reviews, protocols for Cochrane reviews, and editorial materials

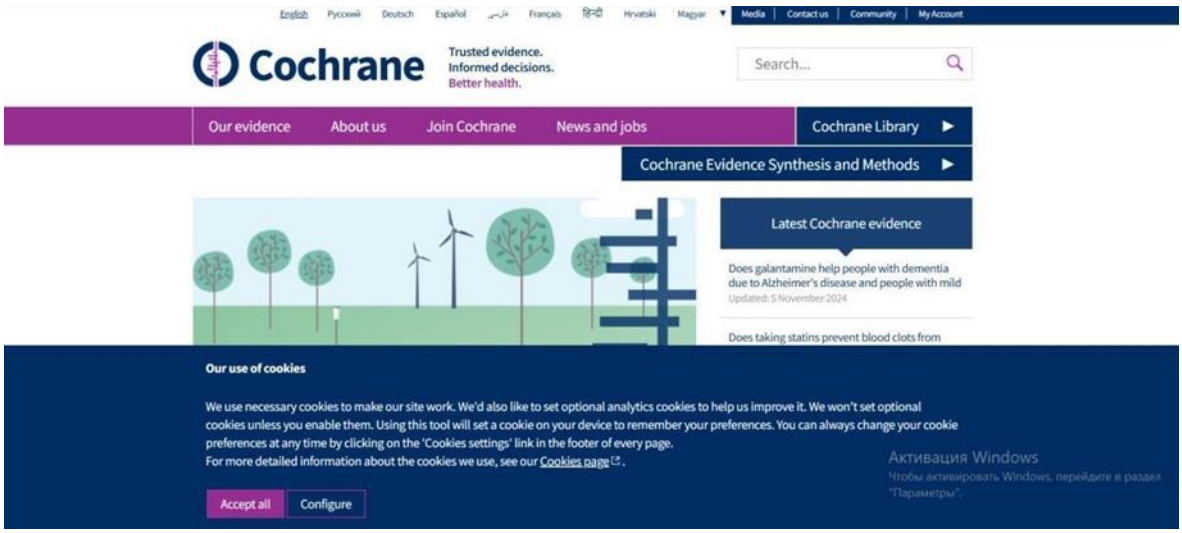

Figure 5. Cochrane Database of Systematic Reviews
(Source: https://www.cochranelibrary.com/)

The Cochrane Central Register of Controlled Trials (CENTRAL) is a bibliographic database of controlled studies that have been used in the preparation of Cochrane systematic reviews.

Cochrane Clinical Answers (CCA) provide practitioners, healthcare professionals, public health specialists, and patients with easy-to-read, concise, and clinically oriented evidence-based information derived from Cochrane reviews.

IPR SMART is an electronic library system with extended features for students and teachers (Figure 6). This platform provides higher education institutions with access to a modern digital library and various useful services that facilitate and support the educational process (Figure 7).

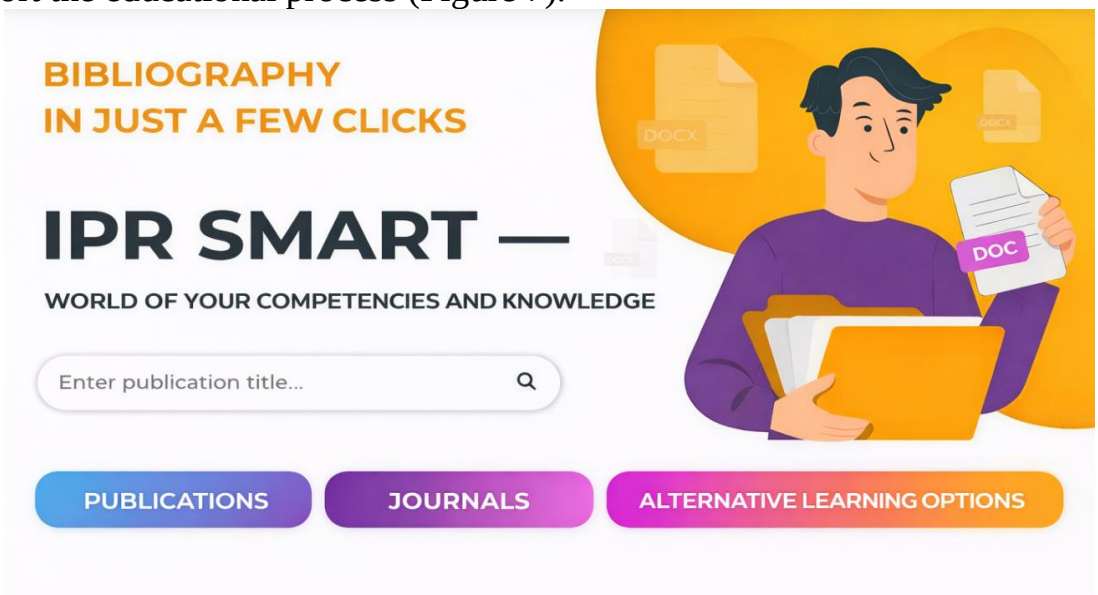

Figure 6. Web Page of the IPR SMART Electronic Library System
(Source: https://www.iprbookshop.ru/auth)

One of the main functions of **IPR SMART** is providing online access to educational materials. The platform includes textbooks, research papers, articles,

methodological manuals, and various learning resources. In addition, IPR SMART offers modern tools aimed at the digitalization of the educational process, such as interactive tests, online courses, the creation of personalized learning plans, and monitoring of learning outcomes (Figure 8).

The advantages of this system include 24/7 access to a wide range of educational materials, a user-friendly interface and advanced search functionality, the ability to use learning content in various formats (text, video, audio), as well as tools for planning and tracking the learning process.

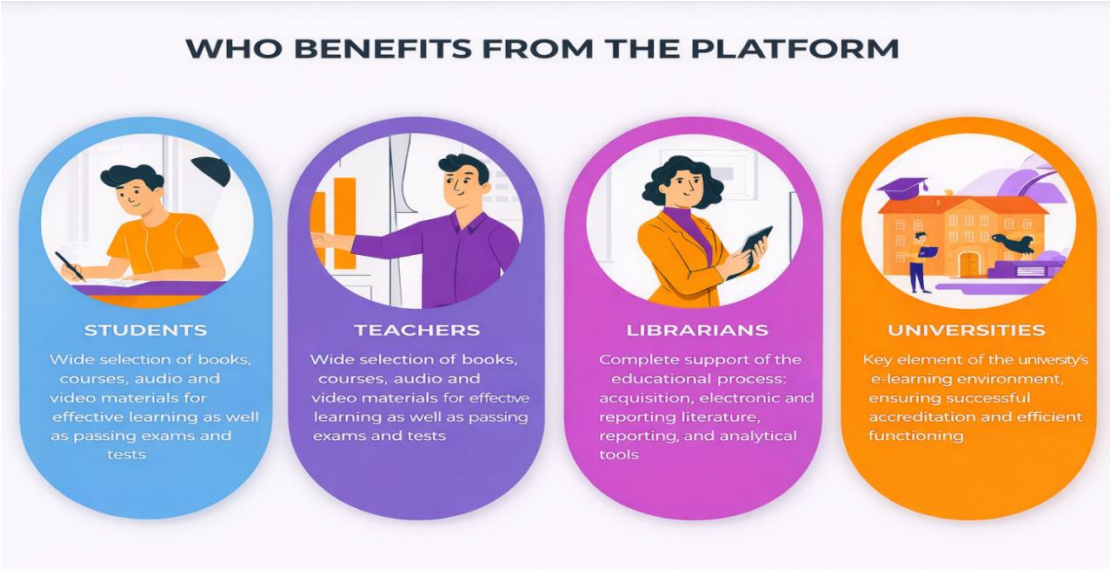

Figure 7. Users of the IPR SMART Electronic Library System
(Source: https://www.iprbookshop.ru/auth)

Higher education institutions use this platform by adapting it to their institutional needs in order to improve the effectiveness of teaching and learning processes.

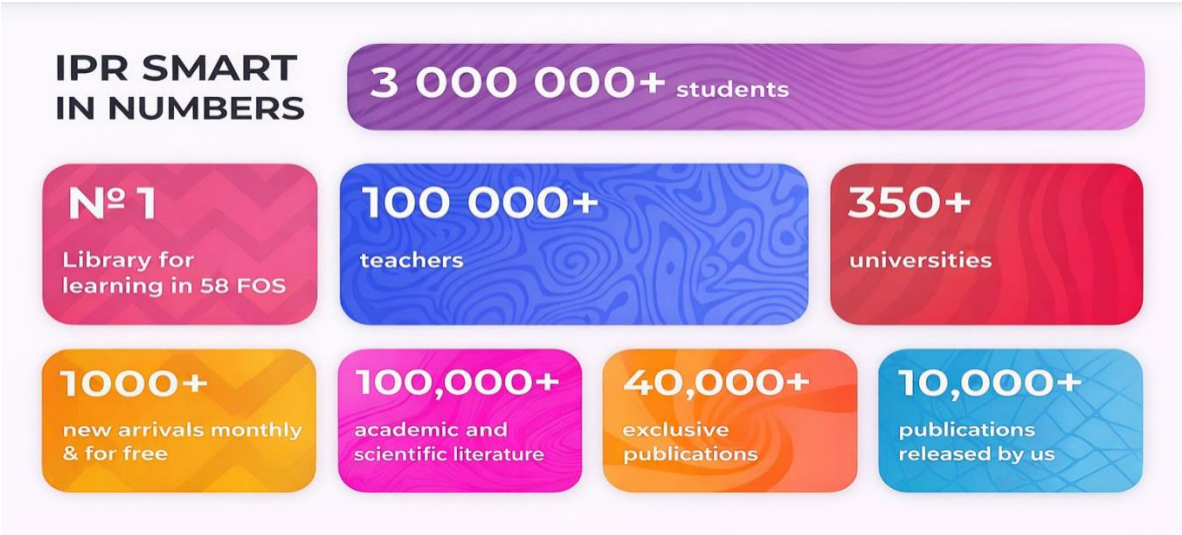

Figure 8. Digital Indicators of the IPR SMART Electronic Library System
(Source: https://www.iprbookshop.ru/auth)

The **“Zan” database** represents the most comprehensive electronic collection of legislation of the Republic of Kazakhstan regulating the country’s socio-political, economic, and international activities, as well as other normative legal acts of the Republic of Kazakhstan (Figure 9). The database includes archived previous versions of documents, necessary references and explanations, and a collection of repealed acts, which makes it possible to track amendments in chronological order.

The information contained in the database is compiled from official sources of publication, thereby ensuring the accuracy and reliability of regulatory materials and their proper monitoring. The database is equipped with Russian–Kazakh explanatory dictionaries of legal terminology, unregistered documents, thematic search functions, various reference collections, and classifiers. Its advanced document search capabilities enable users to promptly locate the required information.

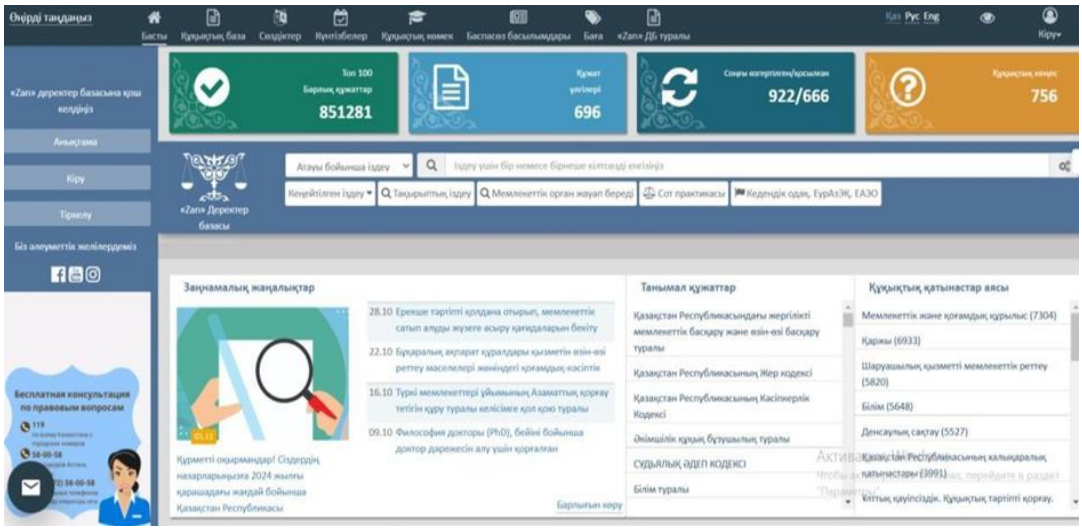

Figure 9. Web Page of the “Zan” Database
(Source: https://zan.kz/ru)

“Paragraph” is a unique reference and information system that integrates several information blocks. Through this system, users can find addresses and contact details of government institutions, public utilities, and organizations operating in the social and service sectors, as well as other reference information.

In addition, scientific publications relevant to the project topic can be searched through the national subscriptions of the Ministry of Science and Higher Education of the Republic of Kazakhstan, such as *Web of Science*, *ScienceDirect*, and *Scopus*.

The use of artificial intelligence tools such as *ChatGPT* in the course “Project Activity” enhances the effectiveness of the learning process, stimulates active learning, and fosters the development of students’ creative abilities (Figure 10). In the field of medicine, the application of *ChatGPT* is reflected in various aspects.

Use of ChatGPT in Project Activities. *ChatGPT* assists in collecting a wide range of information on topics related to medical education and research. When searching for data required for their projects, students can use *ChatGPT* to quickly and efficiently retrieve information, as well as to analyze scientific literature, research findings, and statistical data. For example, by submitting the query "Find recent studies on infectious diseases," *ChatGPT* can provide students with relevant data and scientific articles [7].

In project work, it is essential to formulate research questions correctly. *ChatGPT* helps students develop relevant and engaging research questions, explore topics in greater depth, and identify medical problems. For instance, it can assist in formulating questions on topics such as "The role of vaccination in combating infectious diseases."

ChatGPT can also support project planning by helping to define work stages, timelines, and required resources. Students may receive recommendations from ChatGPT on structuring a project and identifying necessary tasks. For example, they can request information using the prompt "How to develop a research project plan on infectious diseases?"

Furthermore, *ChatGPT* can assist students in writing scientific texts, reports, presentations, and other project-related documents. In this context, the chatbot provides suggestions for drafting, editing, and structuring texts. For example, students may ask: "Create a structure for a report to present the project results."

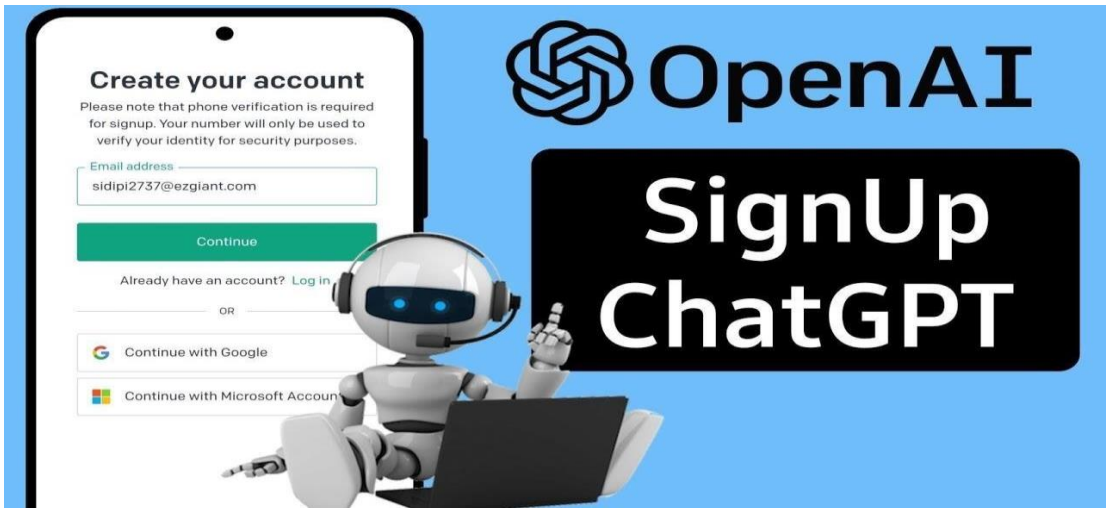

Figure 10. Artificial Intelligence — ChatGPT
(Source: https://openai.com/)

Through dialogue with *ChatGPT*, students gain opportunities to develop critical thinking, defend their own viewpoints, build arguments, and form new perspectives. For example, discussions can be conducted using questions such as "How can arguments against vaccination be refuted?"

When presenting project results, *ChatGPT* helps students receive feedback, identify the strengths and weaknesses of a project, and formulate recommendations. This contributes to the improvement and further development of project work. For

instance, by using the prompt “Evaluate the main sections of my project,” students can identify its advantages and shortcomings.

Ethics plays an important role in medical projects. *ChatGPT* can be effectively used to organize discussions on ethical aspects and to examine examples and cases related to medical ethics. For example, topics such as “Issues related to the protection of patients’ rights” can be discussed.

When using *ChatGPT*, it is essential to consider data accuracy, ethical standards, and the development of creativity. Verifying the correctness of information provided by *ChatGPT* is crucial, as the system may generate responses that are not based on the most up-to-date data. Students should always compare the provided information with reliable scientific sources.

Information and ideas obtained with the help of artificial intelligence should be considered from an ethical perspective. This supports decision-making in medical projects while taking into account the interests of patients and society.

ChatGPT may support the development of creative abilities; however, students must actively develop their own ideas and perspectives and invest intellectual effort to refine and substantiate them.

The use of *ChatGPT* in the course “Project Activity” enables students to improve the learning process, develop creative and critical thinking skills, and explore medical issues. By effectively using artificial intelligence tools, students can deepen their knowledge and enhance the quality of their project work.

To organize information, it is necessary to systematize data and eliminate unnecessary content. First, the collected data are structured in a specific order, for example, by topics or issues. Information that does not correspond to the project objectives is excluded, leaving only relevant and significant data.

For information analysis, appropriate analytical methods are first selected, followed by data interpretation and synthesis of results. The choice of analysis method depends on the type of project and may include statistical analysis, qualitative analysis, comparison, and classification methods. Proper interpretation of the collected data is essential to determine how well each indicator aligns with the overall project objectives. The results of the analysis help to plan the project effectively, assess its strengths and weaknesses, and identify risks and opportunities.

To apply the analysis results, management decisions must be made, risks mitigated, and the project plan adjusted. Information analysis enables informed decision-making in subsequent stages of project implementation, helps reduce potential risks, and allows necessary revisions to the initial plan, thereby increasing the overall effectiveness of the project.

Data collection and analysis play a crucial role in project management and successful implementation. The results obtained at this stage contribute to guiding the project in the right direction.

Project Implementation

The project implementation phase is the stage at which the project’s ideas and plans are translated into practical action, meaning that specific activities and tasks are carried out to achieve the project objectives. At this stage, effective use of all

resources, time management, and proper allocation of financial resources are critically important. In addition, monitoring project progress and implementing corrective measures play a significant role.

During the project, the planned tasks and activities are executed. These may include conducting clinical trials, introducing new methods, implementing research activities, and carrying out the necessary laboratory or medical procedures. All activities should be performed in accordance with the project plan; however, if required, adjustments to the plan may be made.

The resources required for the project (human, financial, and material) are used efficiently. At this stage, timely delivery of tools and equipment needed for each task is ensured, and the availability of sufficient workforce is maintained. Financial control is carried out, and project activities are performed within the approved budget [8].

Project implementation is continuously monitored to ensure adherence to the plan. The results of each phase are reviewed, and coordination among working groups is regularly assessed. Indicators related to time, cost, and quality are monitored to confirm that planned activities are being carried out correctly.

Potential risks that may arise during project implementation are closely monitored, and preventive measures are applied. If unexpected difficulties or obstacles occur, appropriate response actions are taken. In accordance with the risk management plan, necessary adjustments and alternative actions are introduced.

Effective communication among all project participants is ensured throughout the implementation phase. An information exchange system is organized, and regular progress reports are provided. Project participants and stakeholders are informed about completed tasks and ongoing activities. At this stage, internal meetings and control measures are particularly important.

Errors and deficiencies identified during the project are promptly addressed and corrected. This approach helps maintain project efficiency and improve the quality of implementation. Necessary adjustments are made based on project outcomes and phase results, enabling optimal achievement of the project objectives.

During the project implementation phase, all planned activities are completed, resources are used efficiently, risks are managed, and time and financial expenditures are kept under control. The successful completion of this phase represents a crucial step toward achieving the project goals and provides tangible results and positive experience for all project participants.

Trello is a convenient online platform for project management and task organization. Thanks to its visual interface and interactive features, it facilitates effective teamwork. On *Trello* boards, projects can be planned, monitored, and implemented using cards and lists. To create a board in Trello, users need to visit the Trello website (trello.com) or install the mobile application, then register or log in. To create a new board, the **"***Create new board***"** button is selected on the homepage. The board name, background, and privacy settings (private, team, or public) are then defined.

A Trello board consists of three main components. The first is lists, which represent project stages or different phases of the workflow, such as “Planning,” “In Progress,” and “Completed.” The second component is cards, which represent individual tasks or project elements and are placed within lists. Cards can include a title, description, due date, labels, checklists, and attachments. The third component involves tasks and team members: within cards, tasks can be defined and team members can be assigned responsibilities.

Lists are created for each stage of the project, and the necessary cards are added to each list. For example, the “Planning” list may include cards such as “Problem Identification” and “Data Collection.” To edit a card, it is opened to add detailed information, including a description of the task’s purpose and objectives, the deadline, and subtasks to monitor progress. Files and links can be attached when necessary (Figure 11).

To track task progress, cards are moved from one list to another. For instance, when a task is completed, it is transferred to the “Completed” list. Team members are assigned to cards, and their responsibilities are distributed accordingly. Communication among team members is maintained through comments and notifications [9].

In Trello, reports and performance indicators can also be generated to monitor cards and lists. Timely reports and analytical reviews are used to assess the effectiveness of team performance.

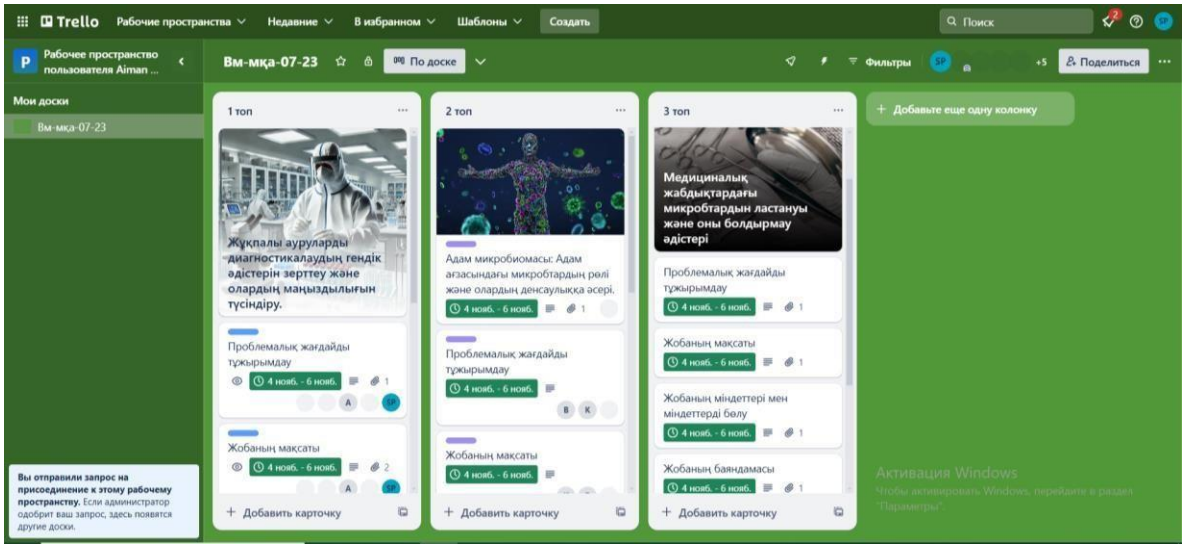

Figure 11. Workflow with the Trello Board
(Source: https://trello.com/b/Uf6AlOYz/%D0%B2%D0%BC-%D0%BC%D2%9B%D0%B0-07-23)

The *Trello board* enables easy task management by visually displaying the stages of a project. Tasks can be added, modified, and updated at any time. The platform facilitates collaboration among team members, as all information is stored in one place. All changes and updates for each card can be easily tracked.

The *Trello* board is an effective tool for project management. It offers efficient solutions for visually organizing tasks, coordinating teamwork, and monitoring

project progress. By using Trello, students and professionals can simplify project activities and improve overall outcomes.

Pig Chat is a project designed to facilitate communication within a group. Its primary purpose is to establish effective interaction in the learning process and to accelerate information exchange between students and instructors. This chat is not only a messaging tool but also a system that provides easy access to learning materials, assignments, and tests.

Use of Pig Chat in Project Activities. Through the Pig Chat platform, students can collaborate effectively on group projects. They can exchange opinions in real time, share ideas, distribute tasks, and coordinate project implementation. For example, in a project on the prevention of infectious diseases, each student can perform assigned responsibilities while using the platform to share comments and suggestions.

Pig Chat allows students to easily share and analyze information required for a project. The ability to send files and links enables quick access to research materials. For instance, students can share scientific articles and research results in the chat, discuss them, and collect data necessary for the project.

After presenting their projects, students can use Pig Chat to receive peer feedback and obtain suggestions for improving project quality. This process contributes to the development and refinement of the project. For example, by asking "What do you think about my project?" students can engage in discussions with their peers.

Pig Chat is also an effective tool for discussing and formulating research questions. Students can share their ideas and collaboratively identify research directions. For example, a discussion such as "What questions can be asked regarding the effectiveness of vaccination?" can be organized.

Pig Chat can be used to share learning materials, lecture notes, and seminar summaries. Students can easily access the materials they need. For instance, instructors may share presentations on medical topics in the chat, while students discuss them and ask questions.

Virtual seminars and discussions can be organized via *Pig Chat*. Students can exchange views on specific medical issues and participate in lectures and debates. For example, a discussion on the topic "Mental Health During a Pandemic" can be conducted.

The *Pig Chat* platform can also host training sessions and workshops for students, allowing them to acquire new skills. This supports the development of practical competencies required in the medical field. For example, a workshop on "Ethical Issues in Patient Communication" can be organized.

When using *Pig Chat*, it is important to consider feedback culture, content accuracy, and time management. Students should be encouraged to engage in constructive and respectful communication. A culture of peer evaluation is applied to enhance the quality of information shared on the platform [10].

It is essential to verify the accuracy of information shared on the platform, as data provided by students must be scientifically grounded. During project implementation, references to scientific sources should be included.

To use *Pig Chat* effectively, students need to manage their time properly, as the interactive environment allows for the accumulation of large volumes of information. Effective time management increases the efficiency of project work.

The use of *Pig Chat* in the course "Project Activity" promotes collaboration, creativity, and the development of communication skills among students. The platform's interactivity and information-sharing capabilities make it an effective tool for implementing medical projects. Active engagement among participants enables students to deepen their knowledge and successfully complete high-quality project work.

Analysis and Summary of Results

After the project results are obtained, they must be analyzed and summarized. The project outcomes are compiled and analyzed in accordance with the established objectives. At this stage, the effectiveness and reliability of the results are evaluated based on clinical data, laboratory analyses, or statistical indicators. The main conclusions of the project are formulated, and the extent to which the project objectives have been achieved is determined. In addition, the potential for future application of the results is considered.

All data and results obtained during the project are collected, organized, and systematized. This stage includes research findings, outcomes of clinical trials, experimental results, and other relevant information. Taking all indicators into account, the project's achievements and shortcomings are identified.

The level of achievement of the project objectives is determined. The extent to which all project tasks have been completed is evaluated, and the degree to which the set goals have been achieved is assessed. In particular, the quality of implementation of objectives such as the introduction of new methods, clinical trial outcomes, and improvements in patient conditions is evaluated [11].

Difficulties, obstacles, and deviations from the plan encountered during the project are identified. Their impact on the project is analyzed, and the underlying causes are examined. Errors and deficiencies are detected, and the measures taken to correct them are reviewed.

A general conclusion is drawn regarding the extent to which the project objectives have been achieved. At this stage, the results are clearly structured, and the project's effectiveness and long-term impact are assessed. The accumulated experience is summarized, and recommendations are developed for use in future projects.

An analysis of the overall project outcomes, costs and benefits, as well as its social, economic, and medical impact is conducted. The final project deliverable is evaluated to determine the specific results achieved. A comprehensive report is prepared detailing the activities carried out, the results achieved, and the experience gained. This report is presented to all project participants and stakeholders. The report includes information on all project phases, completed activities, the budget, and the overall effectiveness of the project.

Based on the project results, recommendations and guidelines are developed for future projects. This step helps improve the effectiveness of subsequent project initiatives. Challenges encountered during the project and the methods used to address them can also be applied in similar projects.

This stage allows for a comprehensive evaluation of all aspects of the project. By assessing the effectiveness of the results and identifying challenges and potential deviations, valuable experience is accumulated that can be applied in future projects. The success of the project implementation, the quality of its outcomes, and its long-term impact are determined at this stage [12].

1.2.6. Presentation of Project Results

After completing the project, it is important to present its results. This may serve as a basis for their application in the scientific community or in practical settings. Research findings can be presented in the form of presentations, scientific articles, or reports. At this stage, students communicate the key aspects of the project and the obtained results to the audience. The results should be defended and presented in a clear and understandable manner. This allows students to confidently present their research and demonstrate its significance.

A comprehensive report on the project results and achievements is prepared. This report should cover all stages of the project, including planning, implementation, monitoring, evaluation of results, and formulation of conclusions. The report provides detailed information on the level of achievement of project objectives, completed tasks, applied methods, encountered challenges, and obtained outcomes.

The social, economic, and scientific impact of the project, as well as its contribution to the medical field, is assessed.

To visually present the project results, a presentation is developed. At this stage, key data, tables, charts, and graphs are used to present the project outcomes to the audience in a clear and engaging manner. The presentation should be well structured, concise, and impactful, with a focus on the main results.

Canva is a convenient online platform for visually presenting and defending project results. In *Canva*, the process of creating presentations, adjusting design elements, and adding graphics is simple and intuitive. To create a presentation in *Canva*, users need to visit the *Canva* website or download the mobile application, then register or log in. To start a new presentation, the *"Create a design"* button is selected on the homepage, followed by choosing the *"Presentation"* option. Users can then explore a wide range of ready-made templates and select one that best matches the project topic (Figure 12).

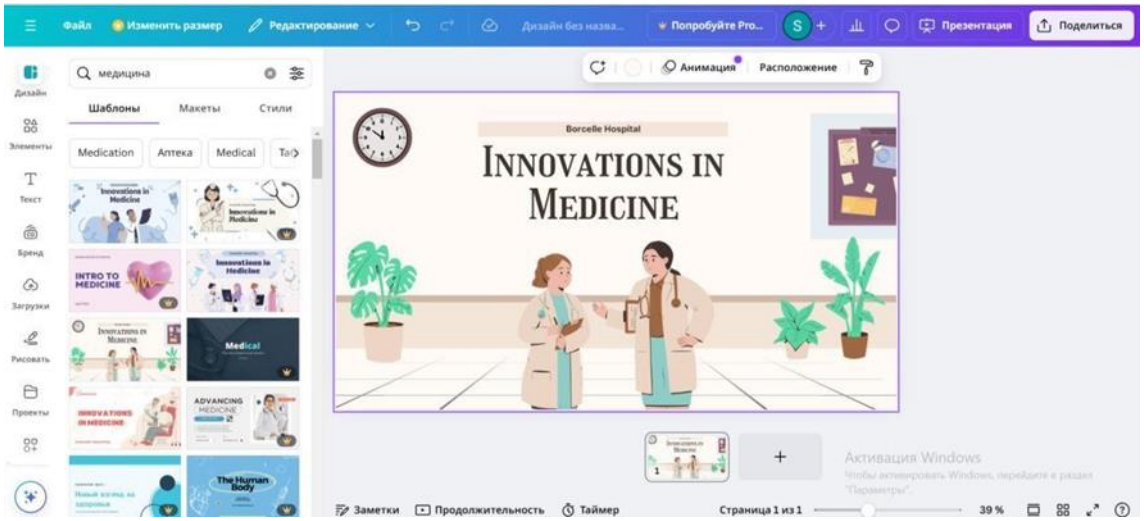

Figure 12. Canva Platform
(Source: https://www.canva.com/templates)

The structure of the presentation is defined. According to the structure, the introduction presents the topic and purpose of the presentation, as well as the team members.

When defining the problem, the research topic and its relevance are presented. The main problems and research questions are formulated.

The research process and the methods used are described. Brief explanations are provided for methods such as surveys, interviews, and experiments.

The main results of the project are presented. Graphs, charts, and tables are used for visualization [13].

The results are analyzed, and key conclusions are outlined. *SWOT, PESTEL*, or other analytical models are applied.

Recommendations and solutions based on the project results are proposed. Practical recommendations aimed at solving the identified problem are developed. A brief overview of the main conclusions of the presentation is provided, and presenters should be prepared to answer questions.

In the presentation design, special attention is given to the text: slides contain concise and clear information. The size and color of the text are adjusted appropriately. To demonstrate the project results, graphs, charts, images, and illustrations are added. Useful resources from Canva's graphic library are utilized. Ready-made templates and a consistent design style are selected to ensure visual coherence. Animations and transitions between slides are added to enhance the dynamics of the presentation and facilitate information delivery.

The presentation is saved and exported in *PDF* or *PowerPoint format*, and a link can be shared if necessary.

Before defending the project, it is recommended to rehearse the presentation several times, speaking aloud. It is important to memorize the key points and essential information, as questions related to the project may arise.

During the defense of a presentation, it is important to be confident and to speak in a dynamic and clear manner.

The *Canva* platform is an effective tool for visually presenting and defending project results. Thanks to its user-friendly interface and a wide range of design options, it enables the creation of presentations at a professional level. Paying attention to the structure and content of the presentation, as well as the quality of visualization, enhances the overall effectiveness of the project work.

Project results may be presented to clients, investors, or scientific organizations. At this stage, it is necessary to consolidate all key information and present it in the form of accurate, reliable, and convincing data. It is important to respond to questions from stakeholders and to explain the project's effectiveness and its potential for future application [14].

Based on the project outcomes, a discussion is organized. At this stage, all stakeholders can express their opinions regarding the results obtained, while project leaders and implementers respond to the feedback provided. During the discussion, possibilities for further application of the results and additional proposals are considered, and the project's long-term effectiveness and development prospects are evaluated.

The scientific results of the project or medical achievements are published in scientific journals or medical publications. This allows the scientific community to receive broader information about the project. If the project involves the implementation of a specific innovative product or method, attention should also be given to protecting patent or intellectual property rights.

Based on the project results, recommendations are developed for future projects and studies. For example, if the project is based on clinical research, recommendations may be proposed for its large-scale implementation or for the further improvement of new methods. In addition, challenges encountered during project implementation and ways to address them are analyzed in order to apply this experience to similar projects in the future.

This stage is crucial for the accurate communication of the project's final results, as it enables all parties to clearly understand how the project was carried out and what impact it had. A well-organized stage of presenting results contributes to the successful completion of the project and helps lay the foundation for securing funding or support for future projects.

1.2.7 Final Evaluation and Reflection

The final stage of the project involves its evaluation and analysis of the work performed. The effectiveness of the project and the possibility of applying its results in medical practice are assessed. Learners analyze their achievements and shortcomings and consider how similar projects can be improved in the future. At this stage, the experience gained and the skills developed are reviewed.

In project analysis, the development and analysis of questionnaires using Google Forms is one of the effective tools. It is an accessible and convenient tool for both learners and researchers. The process of designing, distributing, and analyzing questionnaires enhances the quality of research work and enables a deeper understanding of medical issues and project topics.

To prepare a questionnaire in *Google Forms,* it is necessary to log in to *Google Drive* and select *"New"* → *"Google Forms."* At the top of the form, the *Form Title* and *Form Description* are entered. This helps respondents understand the purpose of the survey.

To add questions, appropriate question types are selected. These may include short text responses for brief comments, single-choice or multiple-choice options, as well as rating scales from 1 to 5. The required information is entered for each question. To make a question mandatory, the "*Required*" option is enabled. In the Theme section, the design of the questionnaire, including colors, fonts, and background, can be customized. By clicking the *"Send"* button, the questionnaire can be distributed via email, a link, or social media. To embed the questionnaire on a website or blog, the «*HTML»* code can be copied.

To view survey responses, it is necessary to go to the *"Responses"* tab at the top of *Google Forms*. To view the results in a table format, *Google Sheets* can be used, where all responses are automatically collected and organized.

In *Google Sheets*, the *Chart* tool is used to create graphs and diagrams for visual representation of the results for each question. Different types of charts, such as bar charts and pie charts, can be created.

Survey results are analyzed from a statistical perspective. Combining qualitative and quantitative analysis allows for a deeper understanding of respondents' views.

Based on the analysis of the survey results, conclusions are drawn. If necessary, recommendations and solutions are proposed, and conclusions on medical or project-related issues are formulated.

For visual presentation of the results, a presentation is prepared and can be delivered at group meetings or scientific conferences [15].

Preparing a questionnaire and analyzing it within the course *"Project-Based Activities"* make it possible to evaluate students' project work, study their experience, and improve the effectiveness of their activities. The main purpose of the survey is to assess the level of students' participation in project-based activities.

The stages of project-based activities include clearly defined goals and objectives at each step and train students to work systematically. Each stage is aimed at the successful completion of a medical project and plays an important role in developing the professional skills of future specialists.

1.3. TOOLS AND METHODS OF PROJECT-BASED ACTIVITIES

In the process of implementing project-based activities, various tools and methods are used. These tools and methods contribute to the development of learners' analytical, creative, and practical skills. The tools and methods applied in medical projects require special attention, as they are aimed at preparing learners for real medical practice.

Research methods. Research methods make it possible to establish the scientific foundation of a project, collect data, and analyze them. At the initial stage of a project, a review of scientific articles, books, and research findings is conducted.

Through this approach, learners synthesize existing information on the topic and build their project on this basis.

Clinical studies and laboratory tests are an integral part of medical projects. Through experiments, new treatment methods or diagnostic approaches are tested.

Surveys and interviews are used to collect the opinions of patients, physicians, or healthcare workers. This method is particularly important in public health projects or in studies assessing patient satisfaction levels.

Analytical tools. Analytical tools help process and analyze the data collected during project implementation.

Statistical analysis of the data accumulated in the project is of great importance. In medical projects, statistical methods allow the assessment of disease prevalence, the effectiveness of treatment methods, or the outcomes of specific studies.

Data collected from patients, results of medical examinations, and other information are subjected to clinical analysis. This tool plays a key role in medical decision-making.

SWOT analysis helps identify the strengths and weaknesses of a project, as well as its opportunities and threats. *SWOT* analysis makes it possible to define the main directions of a project before it begins and to anticipate potential challenges in advance.

The elements of *SWOT* analysis include strengths, weaknesses, opportunities, and threats.

The advantages or strengths of a project reflect its competitive advantages, as well as its resource and intellectual potential. In the medical field, such factors include the scientific validity of the project, the involvement of competent specialists, and the availability of high-technology equipment. Strengths increase the likelihood of successful project implementation. A high level of experience among project participants, sufficient resources, and the ability to conduct research on a full scale are considered key strengths of a project.

Weaknesses are internal factors that may hinder the successful implementation of a project. These include insufficient resources within the project, a limited availability of technical equipment, inadequate organization of teamwork, or time constraints. In the medical field, weaknesses may negatively affect the accuracy and reliability of project results [16 1p].

The lack of necessary equipment for project implementation or the involvement of specialists with limited experience in medicine may also be considered weaknesses.

Opportunities are external factors that support project development or contribute to the improvement of its outcomes. Effective use of opportunities increases the likelihood of project success. If a project aligns with specific reforms in the healthcare system or enables the introduction of new technological innovations, these aspects are regarded as opportunities for the project.

Threats are external factors that pose risks to the success of a project. These include resource shortages, legislative changes, epidemiological conditions, economic difficulties, or increased competition. In medical projects, it is important to identify

potential threats in advance and be prepared for them, as such factors may lead to project suspension or a decline in the quality of results. Reduced funding or unexpected legislative changes may have a negative impact on medical projects.

The importance of SWOT analysis in project activities. Through *SWOT* analysis, it is possible to support the strengths of a project, improve its weaknesses, effectively utilize opportunities, and prevent threats, thereby ensuring the sustainable development of the project (Figure 13).

Analyzing the weaknesses of a project makes it possible to identify the resources required to address them and to plan ways for their rational and efficient use. In the medical field, resources are often limited; therefore, their proper planning is of particular importance.

Early identification of threats increases a project's readiness for external changes. This enables the project team to rapidly adapt to unforeseen situations [17].

SWOT analysis helps define the overall project strategy and supports informed decision-making. In medicine, such decisions directly influence the long-term success of a project, as every medical project affects patient health, society, and the healthcare system as a whole.

Figure 13. Example of a SWOT analysis.

SWOT analysis contributes to improving the efficiency and effectiveness of project activities. In the medical field, this method makes it possible to take into account all important factors related to a project, leverage its strengths, improve weaknesses, and be prepared for potential threats. Such analysis helps the project team make informed decisions and creates conditions for the successful implementation of the project.

Diagnostic tools. In medical projects, the use of diagnostic tools plays a key role. Methods such as ultrasound examination (US), radiography (X-ray), and computed tomography (CT) are used to carry out diagnostics within the framework of the project. These tools make it possible to identify specific clinical situations and conduct their detailed investigation [18 1p].

Blood tests, microbiological examinations, and biochemical analyses are the main diagnostic methods applied in the project. They allow the study of disease causes and their effects on the human body.

Planning and organizational tools. Proper planning and organization are essential for the successful implementation of a project. A Gantt chart enables the project to be divided into stages and the timelines for completing each stage to be determined. The Gantt chart is one of the effective tools for project time management.

During project implementation, a work plan is developed to allocate tasks and define their deadlines. This document helps each participant clearly understand their role in the project.

Innovative technologies. In modern medicine, innovative technologies are widely used in the implementation of project activities. Specialized medical information systems and electronic databases are employed to store and process medical data. These platforms allow patient information to be systematized and used throughout the project implementation process.

Through the use of medical simulators and virtual simulations, learners can practice skills related to working with patients. These innovative tools make it possible to model real clinical situations and contribute to the development of decision-making skills.

Methods of 3D modeling are used for planning surgical procedures or studying the structure of organs.

Presentation and communication tools. At the final stage of a project, presenting and defending its results is of particular importance. Visual materials and slides are used to communicate project results to the audience. These tools allow the key aspects of the project to be clearly demonstrated.

During the presentation of project results, learners exchange views with other specialists or instructors and engage in constructive discussion. This contributes to improving the quality of the project and refining the results obtained.

Group work methods. Group work is an important component of project-based activities. In a project, the role of each participant is clearly defined. For example, one learner conducts the research, another analyzes the data, and a third prepares the report.

Through the brainstorming method, ideas are generated and discussed, making it possible to identify new solutions. This method develops the creative abilities of group members and helps implement new ideas related to the project.

The tools and methods of project-based activities enable learners to systematically plan their projects, collect and analyze data, conduct practical investigations, and present their results. The research, diagnostic, analytical, and communication tools used in medical projects have a significant impact on the development of the professional skills of future specialists [19].

Situational Tasks for Knowledge Assessment

Situational Task №1

You are students of a medical higher education institution and are working on a project. In the current academic year, your project team has begun implementing two main projects. The first project involves the development of a new diagnostic method, and the second focuses on improving public health and studying vaccination.

Project Description:

1.Development of a New Diagnostic Method. This project involves developing a new method for identifying a specific disease. Within the framework of the project, you are required to conduct various scientific studies and propose a new tool or method.

2.Improvement of Public Health and Vaccination. This project is aimed at increasing vaccination coverage among the population and developing recommendations for the prevention of infectious diseases.

The laboratory equipment and financial resources required for project implementation are limited. Therefore, rational and efficient use of available resources is necessary. Each student participates in the project at a different level: some show low activity, while others encounter difficulties in performing their responsibilities. There are misunderstandings among group members regarding the project's goals and objectives, which negatively affects task completion.

Questions:

1. How can resources be used effectively in the project? What approaches would you propose?
2. How can communication and collaboration within the group be improved? What measures should be taken?
3. Which methods and tools would be most effective for clearly distributing responsibilities among group members?
4. How should the project's goals and objectives be explained in cases of misunderstanding?

Situational Task № 2

Your team has started a project to test a new medical device. The main objective of the project is to evaluate the effectiveness of the new device and ensure its readiness for use in medical practice. According to the project plan, laboratory studies and clinical trials are required to test the device. However, you are falling behind schedule, and the financial resources needed to purchase the required laboratory equipment are limited. In addition, there is a shortage of specialists and resources necessary to conduct certain studies.

Questions:

1. What measures can be taken to avoid extending the project timeline?
2. What solutions would you propose to ensure the efficient use of financial and material resources?
3. How would you modify the distribution of tasks among team members to ensure the timely completion of the studies?

Situational Task № 3

You are implementing a project aimed at improving public health. Within the framework of the project, various responsibilities have been assigned within the group: some participants organize vaccination awareness campaigns, others conduct surveys in public places, while others analyze research results. However, misunderstandings have arisen among some group members. They experience difficulties in establishing effective communication and feel that they are not fully performing their duties. This may negatively affect the project outcomes.

Questions:

1. What measures can be taken to improve communication among group members?
2. How can the contribution of each learner to the project be effectively assessed and responsibilities appropriately distributed?
3. What are the benefits of organizing regular project meetings, and how can they be planned?

Situational Task № 4

You are preparing to start a new medical research project. Initially, the project was aimed at studying a new treatment method for a specific disease. However, based on preliminary studies and available data, it has become clear that this method may be ineffective. The project leader has decided to change the direction of the research or redesign the project using a new approach. This situation has caused a crisis within the team, as some members insist on implementing the original plan, while others do not oppose shifting to a new research direction.

Questions:

1. How can the decision to change the project direction be made with the understanding and agreement of all team members?
2. How can the team be motivated to transition to working in a new direction?
3. What factors should be considered when making decisions during project implementation?

Situational Task № 5

Your group is developing a project aimed at improving public health. The goal of the project is to increase vaccination coverage and prevent infectious diseases. Group members are required to perform various tasks, such as conducting surveys, organizing awareness campaigns, and analyzing research results. At the initial planning stage, you noticed that roles within the group were not distributed effectively. Some learners spend too much time completing their responsibilities, while others finish their tasks quickly; however, there is a lack of coordination in the work.

Questions:

1. What planning methods can be used to effectively allocate roles in the project and clearly define the responsibilities of each participant?
2. How can coordination and coherence among project implementers be improved?
3. How can specific indicators that influence the implementation of the project plan be defined at the planning stage?

Situational Task № 6

You have started working on a new project in a medical institution. The goal of the project is to establish new microbiological laboratories and train staff in order to strengthen infection control in the hospital. At the beginning of the project implementation, due to poorly organized task distribution among different departments, some tasks were performed twice, while others were not completed on time. In addition, as a result of inefficient allocation of resources and time, certain stages were delayed, which may lead to the project not being completed within the planned timeframe.

Questions:

1. What methods should be used to clearly define the scope of the project?
2. What tools can be applied when developing the project schedule? How do these tools facilitate the work of the project team?
3. How can the Gantt chart be used effectively to ensure compliance with project timelines?
4. What measures should be taken if the project is falling behind the established schedule?

Situational Task № 7

Your group is implementing a project aimed at introducing new technologies and methods to improve medical research. For this project, it is necessary to properly plan human resources, equipment, and financial resources. During project implementation, unforeseen expenses arose, and some types of equipment were not delivered within the scheduled timeframe.

Questions:

1. What data should be collected to calculate the required amount of project resources?
2. What steps should be taken in budget management if unplanned expenses occur?
3. How can information about delivery timelines and the cost of equipment required for the project be obtained in advance?

Situational Task № 8

During the implementation of the project, a need arose to train hospital staff. Various difficulties emerged between the training schedule and the execution of work tasks, resulting in delays in some training sessions. Due to poorly organized information exchange between project teams, the number of misunderstandings in the workflow increased, which affected the project outcomes.

Questions:

1. How can risks arising during the project be identified and a risk management plan be developed?
2. What strategies should be used to establish effective communication among team members?
3. What tools or methods can be applied to resolve information exchange issues during project implementation?

Situational Task № 9

You and your group are working on the project "Implementation of a New Methodology." Within the framework of this project, clinical trials and laboratory analyses are being conducted, and new medical methods are being applied. During the project implementation, several changes occurred. At the first stage of the project, all planned tools and resources were delivered on time. However, at the second stage, there were delays in the delivery of certain types of laboratory equipment, and some participants completed their tasks later than scheduled. At this stage, certain financial difficulties also arose, which led to the need for additional funding. During project monitoring, new risks were identified; however, appropriate risk management measures were taken.

Questions:

1. How can the financial and organizational problems that arose during project implementation be resolved?
2. How might delays in the delivery of laboratory equipment and delays in task completion affect the project results? How can this situation be managed?
3. What measures would you take in the event that risks arise?
4. Which results should be analyzed during the project, and what conclusions should be drawn?
5. What recommendations and guidelines would you propose after the completion of the project?

Situational Task № 10

A group of medical students is implementing a project to develop a new vaccine against the COVID-19 pandemic. To identify the strengths and weaknesses of the project, as well as its opportunities and threats, they decided to apply the SWOT analysis method. The students are experiencing difficulties in accurately assessing various aspects of the project using SWOT analysis. They face challenges in precisely identifying the project's weaknesses and in correctly evaluating opportunities and threats.

Questions:

1. What are the main difficulties that may be encountered when applying the SWOT analysis method?
2. What criteria should be considered when identifying the weaknesses of a project?

3. What opportunities can be effectively utilized in a project focused on developing a COVID-19 vaccine?

4. What impact might the early identification of threats have on the project outcomes?

5. How can the results of SWOT analysis be integrated into the project's strategic plan?

Situational Task № 11

During the implementation of a medical project, insufficient exchange of opinions, weak organization of teamwork, and a lack of creative ideas have been observed among learners. There is a lack of coordination among group members, which has resulted in a slowdown in the project's progress. Learners are not using group work methods effectively; in particular, joint discussions of ideas or the application of the brainstorming method have not produced the desired results.

Questions:

1. What measures should be taken to improve the effectiveness of group work methods?

2. What new solutions can be identified through the use of the brainstorming method?

3. What tools and approaches can be used to ensure coordination among group members?

4. What additional methods or techniques can be applied to foster the development of creative ideas?

CHAPTER 2. RESEARCH PROJECTS

Keywords

research project, scientific hypothesis, research question, literature review, study design, quantitative research, qualitative research, mixed methods, randomized controlled trial (RCT), observational study, cohort study, cross-sectional study, case-control study, systematic review, meta-analysis, sampling, data collection, data analysis, SPSS, evidence-based medicine (EBM), Key Performance Indicators (KPIs), effectiveness evaluation, ethical principles, informed consent, confidentiality, bioethics, Ethics Committee, medical innovation

Learning Objectives

By the end of Chapter 2, the student will be able to:

1. Formulate a researchable clinical question and derive a testable scientific hypothesis for a medical research project.
2. Classify types of research projects in medicine (experimental, observational, descriptive, analytical, systematic review) and select an appropriate study design for a given research question.
3. Plan the main stages of a research project: literature review, hypothesis formulation, method selection, data collection, analysis, interpretation, and dissemination of results.
4. Apply quantitative and qualitative data collection methods (surveys via Google Forms, focus groups, clinical observations, secondary data analysis) to medical research projects.
5. Conduct basic statistical analysis of research data and present results in tables and diagrams (using SPSS or similar software).
6. Evaluate the effectiveness of a medical project using Key Performance Indicators (KPI) and outcome measurement frameworks.
7. Identify and apply ethical principles governing medical research (informed consent, confidentiality, non-maleficence, beneficence, justice) and describe the role of Ethics Committees.
8. Critically appraise published medical literature using the principles of evidence-based medicine (EBM).

Algorithm for Achieving Learning Objectives

Follow the steps below sequentially to master the material of Chapter 2:

Step 1 – Review prerequisite knowledge

Before reading Chapter 2, briefly revise the concepts of descriptive statistics (mean, median, standard deviation, frequency distribution) from your Biostatistics course. Revise the definition of "evidence-based medicine" and the hierarchy of evidence (systematic reviews → RCTs → observational studies → expert opinion).

Step 2 – Study Section 2.1 "Main Stages of Research Projects"

Read the section and map the stages onto a flowchart diagram. Identify for each stage: (a) key activities, (b) tools and resources required, (c) common errors to avoid.

Step 3 – Study Section 2.2 "Types of Research Projects in Medicine"

For each study design presented (RCT, cohort, case-control, cross-sectional, qualitative, systematic review): summarize the design in one sentence, list one advantage and one disadvantage, and identify a real-world example from the Kazakhstani healthcare context. Create a comparison table.

Step 4 – Study Section 2.3 "Effectiveness of Medical Projects"

Study the concept of KPIs and outcome measurement. Practice by defining 3–5 specific KPIs for the sample project you developed in Chapter 1 (Step 5 of that chapter's algorithm). Specify how each KPI would be measured and at what timepoint.

Step 5 – Study Section 2.4 "Ethical Aspects of Project Activities"

Read the section and summarize the four core bioethical principles (autonomy, beneficence, non-maleficence, justice) in your own words. Draft a sample informed consent form for a hypothetical survey-based student health project using the template in Appendix 3.

Step 6 – Data analysis practice

Using a dataset provided by your instructor (or a simulated dataset in Appendix 4), perform basic descriptive statistical analysis. Present results in at least two formats: (a) a frequency table, (b) a bar chart or pie chart. Use Google Sheets, SPSS, or any available statistical software.

Step 7 – Solve Case-Based Tasks

Complete the Case-Based Tasks at the end of Chapter 2. Pay special attention to tasks involving study design selection and ethical decision-making, as these are frequently tested in examinations.

Step 8 – Self-assessment

Return to the Learning Objectives of Chapter 2. For each objective, rate your confidence (1–3). Prioritize re-reading sections related to objectives rated 1 or 2 before proceeding to Chapter 3.

Research projects are a type of scientific activity aimed at solving a scientific problem, obtaining new data, or refining existing information. In the field of medicine, research projects are of particular importance, as they contribute to the acquisition of new data for disease diagnosis, the development of treatment methods, preventive measures, and the improvement of the healthcare system.

A distinctive feature of research projects is that they establish a link between science and practice and create opportunities for introducing new ideas and technologies into medical practice. Below are the main characteristics of research projects and their application in the medical field.

2.1 MAIN STAGES OF RESEARCH PROJECTS

Research projects consist of several stages. Each stage has clearly defined tasks and is aimed at achieving the project objectives.

1. Identification of the research problem. At the first stage of a research project, the problem is identified. At this stage, the research question or problem that requires a solution is formulated. In medicine, this may involve identifying the causes of a specific disease, studying treatment methods, or searching for measures to improve public health.

2. Formulation of research objectives and tasks. After identifying the research problem, the objectives and tasks of the study are defined. The objective reflects the expected outcome to be achieved through the research, while the tasks specify the concrete steps required to reach this objective.

3. Literature review and theoretical framework. The next stage of a research project involves reviewing existing scientific literature on the topic. At this stage, the researcher analyzes previously conducted studies, considers their findings, and, based on them, formulates a scientific hypothesis.

4. Selection of research methods. The success of a research project largely depends on the appropriateness of the chosen methodology. In medicine, research methods may vary and include:

Clinical trials used to test new drugs or treatment methods;

Laboratory studies involving the analysis of data obtained from biological materials (blood, tissues);

Questionnaires and surveys conducted to collect and analyze the opinions of patients and physicians;

Observations and experiments used to monitor patients' health under specific conditions or to conduct experimental studies.

5. Data collection and analysis. Data collection is one of the key stages of a research project. At this stage, the required information is gathered through experiments, observations, or surveys. Statistical and analytical methods are applied to analyze the collected data.

6. Analysis of research results. The collected data are analyzed and the research hypothesis is tested. At this stage, it is necessary to determine whether the obtained results correspond to the objectives of the study. The results may have practical applications in medicine.

7. Conclusion and recommendations. After the completion of the research, conclusions are formulated. The conclusion describes the research findings and indicates the possibilities for their implementation in medical practice. In addition, recommendations are provided for continuing the research in the future.

8. Publication of research results. The research results are published in the form of scientific articles, reports, or presented at conferences. At this stage, the researcher shares the results of the project with the scientific community [20 521p].

2.2 TYPES OF RESEARCH PROJECTS IN THE FIELD OF MEDICINE

Research projects in the field of medicine are conducted across various directions, each of which makes a significant contribution to the advancement of science. Medical research projects include clinical studies, epidemiological studies, biomedical and fundamental research, public health research, genetic research, studies on healthcare organization and management, pharmacological research, as well as studies involving the application of innovative technologies.

Clinical research refers to studies aimed at evaluating the safety and effectiveness of new medicinal products, treatment methods, medical devices, and diagnostic approaches. The primary objective of clinical research is to improve patient health, introduce new treatment methods, and prevent diseases. These studies are conducted in accordance with strict protocols and include several phases:

Phase I. The initial stage of research in which a drug is administered to humans for the first time to determine its safety and dosage. Typically, this phase involves 20–80 participants. Short-term side effects and physiological responses are assessed.

Phase II. At this stage, the focus is on evaluating the efficacy of the drug or treatment method, as well as conducting a broader assessment of side effects. The number of participants increases to 100–300. The therapeutic dose is refined, and the clinical effectiveness of the drug is evaluated.

Phase III. This phase involves assessing the efficacy and safety of the medicinal product or treatment method in large groups of patients (thousands of participants). Clinical trials are conducted in different countries, healthcare institutions, and among diverse patient populations. Comparative studies are performed between the new drug and existing standard treatment methods.

Phase IV (post-marketing studies). Conducted after the drug has been introduced to the market, this phase focuses on monitoring

long-term effects and identifying rare adverse reactions. Ongoing patient surveillance and data collection on the drug's effectiveness under real-world conditions continue.

Clinical research includes interventional studies, observational studies, randomized controlled trials, and placebo-controlled studies.

Interventional studies. These are conducted by applying a specific treatment or preventive method while observing its effects.

Observational studies. These involve examining disease progression and the influence of various factors by monitoring patients' health indicators over time without direct intervention.

Randomized controlled trials (RCTs). These are conducted by randomly assigning participants to groups. One group receives the new treatment, while the other receives a placebo or standard therapy, which increases the accuracy and reliability of the study results.

Placebo-controlled studies. In these studies, one group of participants receives a new drug or treatment method, while another group receives a placebo (an inactive substance), which helps determine the true effectiveness of the treatment.

Clinical research plays an important role in medicine. Through such studies, the effectiveness and safety of medicinal products and treatment methods are demonstrated, and new approaches are introduced. The results of these studies contribute to updating standards within the healthcare system and improving methods of disease prevention and treatment.

Epidemiological studies are scientific investigations aimed at examining the distribution of diseases in the population, their causes, patterns of development, and methods of prevention. The primary objective of epidemiological studies is to identify the causes of disease occurrence and spread, as well as to develop preventive measures to improve public health.

There are several types of epidemiological studies:

1.Descriptive studies.

These studies are aimed at describing the frequency of diseases in the population, as well as patterns related to time and place of occurrence. For example, they are conducted to identify regions with the highest prevalence of a particular infection.

2.Analytical studies.

These studies investigate the causes of diseases and risk factors influencing their development. The main types of analytical studies include cohort studies and case–control studies.

Cohort studies. These involve long-term observation of a defined group of individuals to assess the incidence of diseases over time. Such studies typically help identify factors that increase the risk of disease development.

Case–control studies. These are conducted by comparing a group of patients with a disease to a group of healthy individuals in order to identify the causes and factors leading to the development of the disease.

Interventional studies. These studies evaluate the effectiveness of preventive or therapeutic interventions. For example, they are used to assess the effectiveness of a specific vaccine.

Ecological studies. These studies are aimed at examining how social, economic, and environmental factors influence the spread of diseases. In such studies, diseases and their causes are considered at the population level.

The results of epidemiological studies make it possible to detect diseases at early stages, improve preventive measures, and enhance healthcare policies.

Biomedical and fundamental research constitutes basic scientific research in the fields of medicine and healthcare. Their purpose is to achieve a deeper understanding of human health and disease mechanisms, develop new treatment methods, and propose innovative solutions to improve health.

Biomedical research is conducted at the intersection of medical science and biology and focuses on studying the physiology and pathology of the human body. These studies are aimed at developing new drugs and treatment methods, identifying approaches for early disease diagnosis, and investigating biological processes [21].

Biomedical research is widely applied in genetics and molecular biology, cellular and molecular studies, immunology, neurobiology, and pharmacology.

Such studies explore the genetic basis of diseases, identifying conditions caused by gene mutations and hereditary factors. They are applied in genomic research and in the use of advanced technologies such as *CRISPR*. Processes occurring in the body at the cellular and molecular levels are investigated, which helps to understand the pathogenesis of various diseases, including oncological and infectious diseases.

Research on the immune system is conducted and used in the development of new vaccines and therapeutic methods, as well as in the diagnosis of autoimmune diseases. The functioning of the brain and nervous system is studied, which is important for research on neurological disorders such as Alzheimer's disease and Parkinson's disease. Neurogenic disorders and cognitive functions are also analyzed.

In pharmacological research, new medicinal products are sought, their effects and side effects are studied, and the mechanisms of their action in the human body are examined.

The results of biomedical research enable the development of new treatment methods, drugs, and diagnostic approaches, as well as the proposal of effective solutions for the prevention and treatment of diseases [22].

Fundamental research (or basic research) refers to studies aimed at exploring the foundational principles of scientific knowledge. Such research seeks to uncover the laws of nature before addressing specific applied problems focused on improving human health and quality of life. Fundamental research contributes to the formation of new directions and ideas in the development of medical science. The aspects of fundamental research include theoretical studies, basic science, and technological innovations.

They are widely used to achieve a deep understanding of the human body and its structures, as well as to develop new biological models. Processes occurring at the cellular and molecular levels are evaluated. In fundamental fields such as anatomy,

physiology, biochemistry, and molecular biology, scientific theories and concepts are developed. These studies help to comprehensively understand the functioning of the body and to identify external factors influencing it. New research tools are developed, and new methods and instruments are created for the practical application of scientific theories.

The results of fundamental research are generally not intended for immediate practical application; however, over time they contribute to laying the foundation for new technologies and methods. For example, fundamental research in the field of genetics paves the way for the development of new methods of medical diagnostics and treatment.

Biomedical and fundamental research form the basis for new discoveries in medicine, the development of new treatment methods, and effective approaches to disease prevention and therapy. While biomedical research is focused on solving specific medical problems, fundamental research is aimed at studying the basic principles of science. Both directions complement each other and make a significant contribution to the advancement of medical science [23].

Public health research refers to scientific studies aimed at improving the health status of society. Their primary goal is to protect population health, prevent diseases, and implement effective policies and interventions based on the study of factors influencing public health. Public health research encompasses disease prevention and control, the development and management of health policy, epidemiology and statistics, environmental issues, social factors, and public information.

Within the framework of such research, measures are developed to control and prevent the spread of infectious diseases. Educational programs for the population are prepared to promote health preservation and disease prevention. Governmental or local authority interventions aimed at protecting individual and public health are examined. The effectiveness of the healthcare system structure and the quality of medical services are evaluated with the aim of improving them. Policies are developed to ensure equity, accessibility, and high quality of healthcare services.

Issues related to the allocation of healthcare resources, the medical insurance system, and the financing of treatment methods are also addressed. The prevalence of diseases in the population, their causes, and patterns of development are identified. To assess population health status, indicators such as quality of life, morbidity, mortality, and other epidemiological measures are analyzed. Preventive measures and health policies are developed to reduce morbidity and mortality.

The impact of environmental factors on human health is studied, including the effects of air pollution, water quality, radiation, and other environmental influences. Specific measures are proposed to reduce the negative impact of environmental factors on public health. The influence of social, economic, and cultural factors on population health is analyzed, and studies on social inequality and its effects on health are conducted.

Public awareness on public health issues is ensured through information dissemination. Health promotion and health education programs are developed, including information on disease prevention, the adoption of healthy lifestyles, and the appropriate use of medical services.

Public health research is of particular importance for the effective implementation of preventive measures, understanding factors that influence public health, improving the healthcare system, monitoring population health status, and ensuring the rational use of healthcare resources [24].

Public health research helps to evaluate the effectiveness of preventive interventions aimed at protecting population health. These studies contribute to understanding the impact of social, economic, environmental, and genetic factors on health, which enables the development of evidence-based policies to improve public health. They provide data necessary to enhance the structure and functioning of the healthcare system and to improve managerial decision-making. By monitoring the health status of different population groups and collecting relevant information, such research identifies which scientific and medical measures are required. These studies propose solutions aimed at the appropriate allocation and efficient use of healthcare resources. The study of healthcare economics, forecasting resource shortages, and ensuring the accessibility of healthcare services are important aspects of this field.

Public health research accumulates scientific evidence necessary to improve population health and supports the development of key strategies and policies for the protection and advancement of public health. It increases the effectiveness of the healthcare system, contributes to the prevention of disease spread, and improves the quality of life of the population.

Genetic research refers to scientific studies aimed at investigating human genetic material (*DNA, RNA, genes*). The purpose of such research is to understand hereditary characteristics, genetic diseases, the effects of genes and their interactions, as well as to develop new diagnostic and treatment methods. Genetics has a direct impact on all levels of human body functioning, including the emergence and progression of diseases, heredity, treatment approaches, and preventive measures.

Genetic research is aimed at identifying the causes of diseases based on heredity. Through such studies, mutations and genetic changes transmitted from parents to children are identified. The genetic causes of hereditary diseases, such as Down syndrome, hemophilia, cystic fibrosis, and others, are investigated. An understanding is formed of genetic mutations and the diseases associated with them, including oncological and cardiovascular conditions.

Genomic research focuses on analyzing the entire genetic information of the human body (the genome). It makes it possible to study the structure of DNA, its functions, and to understand how genes influence the development of various diseases.

Using genome sequencing technologies, the genetic basis of different diseases is identified. As a result of genetic mapping and complete sequencing of the human genome, opportunities arise for the development of new biomedical solutions and methods.

Pharmacogenetics is a field that studies the effects of medications in relation to individual genetic characteristics. These studies aim to increase the effectiveness of drug therapy and reduce side effects by taking into account a person’s genetic code.

This enables the personalization of treatment based on an individual patient's response to medications.

Genetic diagnostics is a method used for the early detection of diseases. It is applied to diagnose hereditary disorders or to assess the risk of developing certain genetic conditions. Early identification of hereditary diseases allows timely implementation of preventive measures.

The purpose of applied genetic research is to translate the results of fundamental research into clinical practice. In other words, the findings of genetic studies are transformed into specific treatment methods aimed at improving human health. In this field, new medical approaches such as gene therapy and genetic engineering are actively being developed.

Genetic epidemiology is a field that studies the distribution of diseases and their genetic basis. These studies help to understand the causes of certain diseases within a population and to determine the role of genetic factors in their development. The investigation of hereditary genetic patterns in society makes it possible to predict the prevalence of diseases in the population.

Genetic research allows for a deeper understanding of the genetic causes of disease development and enables their detection at early stages. This facilitates the diagnostic process and contributes to a more accurate and effective selection of treatment methods.

Genetic research makes it possible to predict how the human body will respond to various medications. This opens up opportunities in the field of pharmacogenetics for selecting effective and safe treatment methods that are individually tailored to each patient. Genetic research also enables the development of treatment approaches for various diseases by modifying the human genetic structure. Within this field, therapeutic strategies aimed at treating oncological diseases, hereditary disorders, and other genetic pathologies are of particular importance.

Through genetic testing and diagnostic methods, hereditary diseases can be identified, allowing for the development of preventive or therapeutic measures. In addition, genetic counseling provides families with information necessary for the prevention or management of such conditions. Genetic research plays an important role in the development of the healthcare system, contributing to the improvement of public health through the implementation of prevention, early diagnosis, and effective treatment strategies.

Genetic research is one of the most significant fields of modern medicine. It opens new opportunities for protecting human health, as well as for the prevention and treatment of diseases. The results of genetic research are applied not only in clinical practice but also in the fields of public health and pharmacology [25].

Research in healthcare organization and management refers to studies conducted to improve the efficiency of the healthcare system, enhance resource management methods, improve the quality of services, and strengthen the provision of medical care to the population. The purpose of such research is to optimize the organization of medical services, identify effective management approaches, and address political and social issues in the healthcare sector.

Within the framework of these studies, the efficiency of the healthcare system, its organizational structure, and financing mechanisms are analyzed, and ways to improve the quality of medical care for the population are identified. By comparing healthcare services in the public and private sectors and examining the experience of different countries and regions, the effectiveness of management systems is assessed. Measures are developed to evaluate the quality of medical services and to increase patient satisfaction.

Issues related to the organization of effective financing of healthcare services and resource management are also examined. Various financing models are considered, such as government budgets, health insurance systems, and private funding sources. Methods for the rational use of necessary resources to optimize healthcare services (human resources, medical equipment, and medicines) are identified. Economic analysis is conducted to control healthcare expenditures and ensure their efficiency.

The study of the management structure of healthcare organizations makes it possible to identify effective methods for their coordination and organization. To ensure coordination among healthcare organizations, information technologies and management systems are introduced. For example, electronic health records and medical information systems are developed. This contributes to the standardization of organizational operations and increases the efficiency of medical care delivery to patients.

For the formulation and implementation of healthcare policy, strategic planning and priority setting are carried out. The long-term development of the healthcare system is planned, and necessary changes are implemented. Such studies help assess the effectiveness of policies aimed at improving population health within a country. In addition, strategic plans are developed for the introduction of innovative methods and technologies in the healthcare sector.

Effective use of human resources in the healthcare sector and the professional development of specialists are ensured. This includes measures to enhance the qualifications of physicians and nurses, organize workplaces, and improve working conditions. The education system is improved to train healthcare professionals and raise their professional competence. Issues related to the rational distribution of workload among healthcare workers, improvement of their working conditions, and increasing job satisfaction of medical personnel are also addressed.

The organization of healthcare services aimed at disease prevention, control of infectious diseases, and promotion of healthy lifestyles is ensured. Policies focused on the protection of public health are developed, and approaches to their implementation are considered. The effectiveness of disease prevention measures applied by both the public and private sectors is evaluated.

Indicators and methods are developed to assess the overall efficiency of the healthcare system, as well as the performance of individual organizations or services. The implementation of innovations and new technologies in healthcare is evaluated, along with their economic and social outcomes. Objective indicators and metrics are defined to assess the performance of healthcare organizations.

These studies help identify the necessary changes and improvements required for the effective functioning of healthcare organizations. Improving management methods is essential for enhancing the quality and accessibility of medical services provided to patients. Effective management of healthcare system resources, including human resources, financial assets, and medical equipment, is a key factor in ensuring the overall efficiency and sustainability of the system. Research offers ways to optimize these processes.

The development of effective health policies and strategic plans contributes to the advancement of the healthcare system. Strategies aimed at combating emerging diseases, implementing long-term healthcare programs, introducing preventive measures, and adopting medical innovations are of particular importance. Enhancing the professional competence of healthcare workers, improving their working conditions, and ensuring the efficient use of human resources contribute to higher-quality medical services. This, in turn, leads to improved patient health and societal well-being.

Research in the field of healthcare organization and management facilitates the introduction of new technologies and medical innovations. This increases the accessibility and quality of medical care and also creates new opportunities for the development of the healthcare system [26 3p].

Research in the field of healthcare organization and management is of great importance for the effective management of the healthcare system, improvement of the quality of medical services, and rational use of resources. These studies make it possible to develop necessary changes and solutions aimed at protecting and improving public health.

Pharmacological research refers to scientific studies aimed at investigating the effects of medicinal products, their safety, efficacy, and methods of use. These studies are a fundamental component of drug therapy and play a key role in the development of new medicines and their introduction into clinical practice. The results of pharmacological research help physicians and healthcare professionals choose the most effective and safe treatment approaches for patients.

Pharmacokinetics is the science that studies the movement of a drug within the body. These studies determine the stages of absorption into the bloodstream, distribution, metabolism, and excretion of a medicinal product. Pharmacokinetics helps to understand the duration of drug action, appropriate dosage, and overall effectiveness. Such studies make it possible to determine how quickly and for how long a drug acts in the body, what transformations it undergoes, and how it is eliminated.

Pharmacodynamics is a branch of pharmacology that studies the effects of drugs on the body. These studies identify the effects of medicinal products on biological systems, cells, and tissues, as well as describe their therapeutic and adverse effects. Through pharmacodynamic research, it is possible to determine which receptors a drug acts on, which biochemical processes it modifies, and to assess its efficacy.

Toxicology is the science that studies the toxic effects of medicinal products on the body. To assess drug safety, their long-term use and effects at high doses are

examined. Toxicological studies help identify adverse effects, toxicity, allergic reactions, and other harmful effects of drugs on the body.

Clinical pharmacology is a branch of pharmacology that studies the effects of drugs in humans. Within these studies, clinical trials of new medicinal products are conducted, and their efficacy and safety are evaluated. Clinical pharmacological research focuses on the effects of drugs in humans, treatment outcomes, and potential adverse effects.

Drug interactions involve the study of how multiple drugs used simultaneously affect each other. In some cases, drug interactions may enhance therapeutic efficacy or lead to an increased risk of adverse effects. These studies help identify rational drug combinations and determine which medications should not be used together.

Determination of drug dosage is aimed at establishing the most effective and safe doses of medicinal products. Proper dose selection helps increase the effectiveness of a drug and reduce the risk of adverse effects. These studies focus on determining the initial dose, the daily dosage, and the safe limits of drug use.

Biopharmaceutics is a field of science that studies the physical and chemical properties of medicinal products in order to improve their biological effects. To enhance drug efficacy, new dosage forms and drug delivery systems are developed. These studies aim to identify new drug formulations and delivery methods to increase the rate of absorption and overall effectiveness of medicinal products in the body.

Pharmacological research plays a crucial role in the development of new medicinal products and in evaluating their effectiveness. It provides essential data required for conducting clinical trials of new drugs. These studies help determine the safety of medicinal products, prevent undesirable effects, and improve their therapeutic efficacy. Pharmacological research is also important for the development of individualized treatment strategies for patients. Within the framework of personalized medicine, optimal doses and dosage forms tailored to a specific patient are determined. Such studies enable the introduction of new treatment methods, assessment of the efficacy and safety of drugs, and the development of new pharmaceutical formulations. Overall, this contributes to improving public health.

Pharmacological research is a fundamental component of studying the efficacy and safety of new medicinal products in medicine. These studies are aimed at drug development, optimization of their use, and ensuring safe and effective therapy for patients. The results of pharmacological research contribute to the introduction of new treatment approaches and medicinal products into clinical practice.

Research on the application of innovative technologies involves studying the implementation of new and improved technologies in the healthcare sector and the ways of their effective use. These studies play an important role in the development of medicine and healthcare systems, as they enable improvements in the quality of medical services, more effective diagnosis and treatment, and the introduction of new methods for disease prevention.

Digital health refers to the use of information technologies in the healthcare sector. It includes electronic medical cards (EHCs), medical information systems, as

well as mobile applications and platforms used for disease monitoring and management.

Telemedicine is the use of technologies to provide remote medical consultations and diagnostics. It is especially important for establishing communication between patients and healthcare professionals in remote areas, under challenging conditions, or during pandemics. These studies are aimed at evaluating the effectiveness, safety, and accessibility of telemedicine and digital tools.

Artificial intelligence and machine learning are innovative technologies used in medical diagnostics and treatment. Artificial intelligence algorithms, for example in the analysis of X-ray or MRI images, disease detection, and support of clinical decision-making by physicians, can be highly effective. These studies are aimed at evaluating the accuracy and effectiveness of artificial intelligence systems in medical diagnostics and treatment, as well as exploring ways to apply these technologies to improve the quality of medical practice.

Genomics is a scientific field that studies the structure of human DNA and introduces new methods to improve the diagnosis of genetic diseases. Genomic research helps to better understand the genetic basis of complex diseases, such as cancer.

Personalized medicine is an approach to treatment based on an individual patient's genetic, environmental, and lifestyle characteristics. These studies enable physicians to select treatment methods in accordance with the patient's genetic profile.

Nanotechnology refers to advanced technologies that use structures and materials at the nanometer scale, which can be applied in medicine for drug delivery, diagnostics, and treatment. Nanoparticles are used for targeted delivery of medications to disease sites, which increases therapeutic effectiveness and reduces the risk of adverse effects. These studies focus on exploring the medical applications of nanotechnology and evaluating their effectiveness.

Biotechnology is a field focused on the development of new medicinal products, vaccines, and cell-based therapies using biological processes.

Cell therapy is a treatment method based on the use of healthy cells to replace damaged or diseased cells. This approach is particularly important in the treatment of cancer, cardiovascular diseases, and neurodegenerative disorders. Research is conducted to evaluate the effectiveness and safety of cell therapy.

Biomedical engineering is an interdisciplinary field at the intersection of medicine and engineering, within which new medical devices and equipment are developed. These include implants, robotic surgical systems, diagnostic devices, and patient monitoring systems.

Medical devices help address many challenges in the healthcare sector, such as facilitating surgical procedures, monitoring patients' conditions, and enabling early disease detection. Research is focused on the development of new medical devices and the evaluation of their effectiveness in clinical practice.

3D printing is a technology used to manufacture customized medical devices, prostheses, tissues, and organs. Through 3D printing, it becomes possible to create

prostheses and implants that fully match the anatomical characteristics of a patient's body.

Regenerative medicine is a field that uses cell therapy, tissue injection, or 3D printing methods to restore tissues and organs damaged as a result of disease or injury. These studies are aimed at evaluating the effectiveness of tissue and organ regeneration using advanced technologies.

New technologies and methods enhance the effectiveness of medicinal products and therapeutic approaches. The application of artificial intelligence and medical imaging technologies allows diseases to be detected at early stages, which contributes to improved treatment outcomes. Thanks to nanotechnology and advanced drug delivery systems, targeted drug action is enhanced, helping to reduce the risk of adverse effects. Digital health technologies and telemedicine provide patients with more convenient and accessible medical services, thereby increasing the overall efficiency of healthcare systems. Biotechnology and cell therapy enable the development of new treatment methods, opening new possibilities for the management of various diseases, particularly cancer and neurodegenerative disorders.

Research on the application of innovative technologies contributes to progress in the healthcare sector by opening new opportunities in medicine and improving patients' quality of life. New methods and technologies ensure the sustainable development of medicine and provide physicians with effective tools for treating complex diseases and enhancing the quality of medical care delivered to patients [27].

2.3 EFFECTIVENESS OF MEDICAL PROJECTS

The effectiveness of medical projects involves assessing the extent to which project objectives are achieved, their impact on society and the healthcare system, and the justification of financial expenditures. The impact of a project on public health is based on how its goals and outcomes contribute to improving population health, as well as on the results of measures aimed at disease prevention, control of infectious diseases, and enhancement of quality of life.

Clinical effectiveness is evaluated according to the efficacy and safety of treatment methods, medicinal products, or medical technologies implemented within the project, as well as on evidence obtained from research and clinical trials, and the effectiveness of new treatment methods and therapies in managing diseases.

Economic effectiveness is based on the relationship between financial costs and the benefits obtained, that is, on the economic feasibility of the implemented innovations and methods. Within the project, rational use of the budget, cost reduction, and efficient management of financial resources must be ensured.

The long-term impact of project outcomes implies that the effects are maintained and continue to develop even after the completion of the project. The project should be sustainable in the long term, with stable funding and the capacity for continued implementation.

Social and ethical aspects are assessed in terms of the project's impact on different population groups, including the provision of equitable access for social

groups. Compliance with ethical standards, protection of patients' rights, and adherence to the principles of fairness are of key importance.

The innovative aspects of a project are related to the novelty of the technologies and methods introduced, as well as their influence on the development of medical science. A comprehensive assessment of the effectiveness of medical projects makes it possible to determine their long-term impact on society and obtain objective results.

The Role of Projects in Medicine. Medical projects contribute to the advancement of science and medical practice. They are aimed at improving methods of early detection, prevention, and treatment of diseases. For example, such projects focus on pressing issues in public health and help improve patients' quality of life. As a result, healthcare professionals gain the opportunity to provide higher-quality and more effective medical care. Medical projects are oriented toward improving public health and perform several important functions. Through these projects, the gap between scientific research and clinical practice is reduced. Participation in medical projects enables students and young professionals to acquire practical skills in disease diagnosis, treatment, and prevention. In addition, projects may generate specific recommendations for improving the quality of services in medical institutions, implementing a personalized approach to patient care, and enhancing the overall efficiency of the healthcare system [28].

Application of Research Results in Practice. The effectiveness of medical projects is closely linked to the practical application of the results obtained. Data generated during research make it possible to introduce new diagnostic and therapeutic methods, as well as preventive measures. For example, recommendations developed as a result of research projects on infectious diseases may play an important role in the prevention of epidemics and in the treatment process.

In addition, the methods and approaches proposed for use in clinical practice must be scientifically grounded and have proven effectiveness. The results obtained through projects have high practical value, as they are oriented toward real-world application in medical practice. When supported by solid evidence, healthcare professionals can directly apply research findings in patient care. For instance, the introduction of new effective methods for the control or prevention of chronic diseases contributes to improving patients' quality of life. This may also lead to important achievements such as the prevention of drug-resistant infections, the development of new approaches in immunoprophylaxis, and the implementation of new standards of patient care.

Innovative Solutions in Project Activities. The use of innovative solutions in medical projects enhances the quality of project implementation.

Such solutions include the application of telemedicine, artificial intelligence, genetic research, and biotechnologies. For example, artificial intelligence enables more accurate and faster results in the diagnosis and treatment of diseases. When analyzing medical images (X-ray, MRI), artificial intelligence allows for early disease detection and facilitates physicians' work. Increased diagnostic accuracy helps ensure more accurate diagnoses for patients.

In remote areas, telemedicine makes it possible to remotely monitor patients, provide consultations, and take urgent measures when necessary. Telemedicine solutions improve the accessibility of healthcare professionals and save time.

Genetics-based projects help identify and prevent hereditary diseases. For instance, the study of genetic markers of oncological diseases makes it possible to predict the risk of malignant tumor development in advance.

The development of vaccines, the creation of new medicinal products, and the advancement of cell therapy methods open new opportunities for the treatment of many diseases. Innovative approaches developed within such projects contribute to updating standards of medical care. Overall, innovative solutions open new prospects for medical projects, increase the effectiveness of diagnosis and treatment, and, in turn, improve patients' health outcomes [18 3p].

Financial Efficiency and Resource Optimization. As a result of implementing medical projects, healthcare expenditures can be reduced. For example, projects aimed at early detection and prevention of diseases help prevent the development of complications and avoid the need for long-term and costly treatment. In addition, telemedicine and automation processes increase the efficiency of healthcare organizations, save physicians' time, and reduce unnecessary costs.

Public Education and Awareness. Many medical projects focus on disease prevention, promotion of a healthy lifestyle, and prevention of the spread of infectious diseases. Through public awareness activities, such projects contribute to improving public health by disseminating knowledge about disease prevention, proper nutrition, and physical activity. Within their projects, students and trainees can use various public awareness tools (webinars, informational brochures, social media posts) to deliver relevant information to broad segments of the population.

Medical projects are aimed not only at treating diseases but also at strengthening population health, preventing illnesses, and improving various aspects of modern medicine. The introduction of innovative solutions within such projects helps significantly improve patients' quality of life and the working conditions of healthcare professionals.

2.4 ETHICAL ASPECTS OF MEDICAL PROJECTS

The ethical aspects of medical projects represent a set of principles and standards aimed at ensuring that project implementation complies with human rights, moral values, and legal norms. Patients or research participants provide voluntary consent to participate in a project after receiving complete information about its content and potential risks. Patients' personal data must be protected and must not be disclosed without their consent. Respect for patients' freedom to choose treatment methods and for their personal opinions is essential. Medical projects should be accessible to all and must not allow discrimination against any social groups based on age, gender, nationality, or economic status. Equal access to medical care should be ensured for every individual. The results and benefits of a project should be distributed fairly and made available to all participants. In all medical research and trials, the health and safety of participants must be a top priority. Project leaders are

obliged to minimize potential risks during the conduct of research. The results obtained in scientific studies must be accurate and objective; distortion of data or inclusion of false information is unacceptable. In placebo-controlled studies, the rights of participants and their opportunities to receive more effective treatment must be taken into account. Projects and research should be consistent with the values and beliefs of representatives of different cultures and religions. Medical projects should be organized with consideration of the social, economic, and cultural characteristics of specific countries or regions. In medical projects, financial interests must not become the determining factor; the independence of researchers and organizations should be maintained, and the objectivity of research results must be guaranteed. Conflicts between financial interests of participants and scientific objectivity should be avoided. When implementing medical projects, their impact on the environment must be considered. The long-term effects of medical projects should be assessed in advance. Taking into account the potential social consequences and outcomes of a project, preventive measures should be planned during its implementation [20 528 p].

Ethics of Medical Projects.In medical projects that combine research and clinical practice, ethics occupies a central place. When conducting medical research, it is necessary to adhere to the principles of medical ethics, including the following:

Non-Maleficence. Within a project, it is essential to avoid causing harm to patients' health. According to this principle, the implementation of a project should avoid the use of methods that may cause direct or indirect harm to patients.

Beneficence. The results of a project should bring benefits to society, patients, or healthcare professionals. In other words, the goals of the project should have a positive impact on the healthcare sector.

Justice. Fairness must be maintained toward all participants during the research process. The principle of justice implies equal treatment of all participants. A patient's rights, social status, or racial background should not influence the outcomes of the research.

Confidentiality. Protecting patients' personal information is of paramount importance. All information related to the project, especially patients' diagnoses and personal data, must be kept strictly confidential. Breaches of confidentiality may not only violate patients' rights but also negatively affect their private lives.

Patients' Rights and Project Impact. In medical projects, patients' rights must be fully protected, and all potential positive and negative effects on their health must be carefully considered.

Informed Consent. Patients must voluntarily agree to participate in a study or project. As part of this consent, they should be provided with complete information about the project's objectives, content, potential risks, and expected outcomes. Only after receiving comprehensive information can patients make an informed decision about participation.

Patients' Rights and Freedom of Choice. Patients have the full right to refuse participation in a project or to withdraw at any time, and this decision must not affect the quality of medical care they receive or their relationship with healthcare professionals. This aspect plays an important role in maintaining ethical standards in medicine.

Project Impact. Project outcomes may have both positive and negative effects on patients' health and on the medical field as a whole. Therefore, potential impacts should be assessed in advance, and all risks to patients and society must be taken into account during project implementation. For example, when studying a new treatment method, it is essential to thoroughly examine its side effects and, if necessary, ensure appropriate precautionary measures.

Social Responsibility. Medical projects carry social responsibility toward the healthcare system and society. This means that projects should aim to achieve positive outcomes not only for patients and their families but also for society as a whole. During research activities, the views of stakeholders and the broader public interest should be considered.

The Role of the Ethics Committee. In many medical projects, approval from an ethics committee is required. The ethics committee carefully evaluates all aspects of the study, including safety, confidentiality, participants' rights, and project methodology. The purpose of the committee is to ensure that the project complies with ethical standards, upholds principles of fairness, and protects the safety of participants[24 2p].

Compliance with legal requirements. Medical projects must be carried out in accordance with the legislative requirements of the country. This ensures the protection of patients' rights, safeguarding of personal data, and compliance of the project with ethical standards. Violations of legislation or failure to meet regulatory requirements may render project results invalid and pose risks to the safety of participants.

Adherence to ethical aspects ensures the safety and effectiveness of medical projects and enhances the reputation of researchers. Protection of patients' rights, observance of the principles of justice and confidentiality are key factors that make project activities ethical and responsible [24 4p].

Situational tasks for knowledge assessment

Situational task №1

You are working on a new project in the field of medicine. The aim of the project is to establish new microbiological laboratories and train personnel in order to strengthen infection control in a hospital. The project must be implemented within 6 months. At the initial stage of the project, a discussion arose among team members regarding which laboratories are required and the level at which staff training should be conducted. The following project-related questions began to emerge:

1. Which specific infectious diseases should be identified in microbiological laboratories?
2. What amount of resources and time will be required for staff training?
3. Based on which SMART criteria should the project be implemented to ensure that its goals and objectives are clear and measurable?

Questions:

1. Which indicators should be established according to the SMART principle to ensure that the project objectives are clear and specific?
2. Which methods can be used to define and formulate the problem?
3. What steps should be taken after the problem has been clearly and effectively formulated?

Situational task №2

You have initiated a clinical research project. The primary objective of the project is to test a new treatment method and determine its effectiveness. However, the initial research results indicate the need to revise the original project objective, as the new method did not demonstrate effectiveness compared with existing methods. The project leader proposed revising the objective, but some team members preferred to maintain the original goal and opposed making changes.

Questions:

1. How can resistance from team members be overcome when revising the project objective?
2. What data and information should be analyzed in order to modify the project's goals and objectives?
3. How should the SMART principle be applied when assessing the effectiveness of project objectives?

Situational task №3

A group of students at a medical higher education institution is conducting a project entitled "Assessment of the effectiveness of a new antibiotic." This project includes clinical studies and laboratory testing. The students are experiencing difficulties in selecting effective tools and methods to be applied at various stages of the research. They encounter challenges in the rational integration of questionnaires, laboratory tests, and diagnostic tools.

Questions:

1. Which tools should be used to integrate clinical studies and laboratory

testing?

2. How can the strengths and weaknesses of a research project be identified using SWOT analysis?

3. How should the results of laboratory tests be statistically evaluated?

4. How can innovative technologies be applied in this project?

Situational task №4

You and your research team are planning to test a new treatment approach — a novel medicinal product aimed at combating antibiotic-resistant infections. The study involves clinical trials, laboratory investigations, and questionnaire-based surveys. The primary objective is to determine the effectiveness of the new drug, its adverse effects, and its safety. At each stage of the study, it is necessary to set clear objectives, appropriately select research methods, and focus on the analysis of the collected data.

Questions:

1. Which key aspects should be considered when defining the research objective, and how are these implemented in medical practice?

2. Which methods and tools are required to ensure the safety of clinical trials?

3. How should the results of questionnaire-based and survey studies be collected and analyzed?

Situational task №5

Your research team is implementing a project aimed at improving public health at the population level. The objective is to study the health status of city residents and to identify diseases at an early stage. During the study, questionnaires are administered and data on the population's health status are collected. Based on the results, it is planned to propose measures necessary to ensure early diagnosis of diseases among the population.

Questions:

1. Is the questionnaire method effective for conducting population health research, and how should questionnaires be designed?

2. Which statistical methods should be applied for data collection and analysis during the study, and how are they implemented?

3. Which approaches would be most effective for publishing and presenting the research results to the public?

Situational task №6

You and your research team are conducting trials of a new antibacterial medicinal product. The objectives of the study are to determine the safety of the drug, assess its efficacy, and investigate its adverse effects. The study is divided into several phases, and specific tasks must be defined at each phase. During the study, randomized controlled trials, placebo-controlled studies, and observational studies are conducted. Your task is to properly organize each phase of the clinical trial and to identify the key steps required when selecting the methodology.

Questions:

1. What is most important during Phase I of a clinical trial, and what should its objectives and tasks be?
2. Which control measures should be applied during Phase II to assess the efficacy of the medicinal product? What randomized controlled trials should be conducted when transitioning to Phase III to evaluate the safety of the new drug?
3. What information does Phase IV (post-marketing study) provide, and what is its significance?
4. How should participants be allocated in placebo-controlled studies, and how can differences between groups be analyzed?

Situational task №7

You are the leader of a medical research team conducting an analytical study aimed at identifying the causes of a disease. The study plans to use cohort and case–control designs. Your task is to appropriately apply the characteristics of each research method and analyze the obtained results. During the study, it is necessary to effectively utilize research methods to identify disease causes and assess risk factors.

Questions:

1. Into which main stages should a cohort study be divided, and what are its advantages and disadvantages?
2. How should the healthy group and the diseased group be compared in a case–control study?
3. Which key factors should be considered to identify factors that increase the risk of disease occurrence in a cohort study?
4. What role do the results of case–control studies play in determining disease prevention measures in medicine?
5. What problems can be addressed by proper selection of study groups and control groups in analytical studies?

Situational task №8

In the city of Shymkent, a new medical project entitled “Safe Health” has been launched. The project aims to prevent infectious diseases, improve treatment methods, and enhance the efficiency of the healthcare system. The project includes the introduction of new diagnostic methods and pharmaceuticals, the use of telemedicine systems, public health activities, and awareness-raising campaigns. The project is being implemented over a period of six months, during which several clinical trials were conducted in hospitals and outpatient healthcare facilities to collect initial results. New methods and technologies were introduced within the project, and informational campaigns were organized for the local population. At each stage, the project must be evaluated from both financial and social perspectives.

Project objectives:

1. To improve the prevention and treatment methods of infectious diseases.
2. To increase the efficiency of healthcare services.
3. To conduct public awareness activities on infectious diseases.
4. To enhance financial efficiency and optimize costs.

Questions:

1. What impact did the new diagnostic methods and treatment approaches introduced within the project have?
2. Assess the financial expenditures of the project.
3. How can the long-term impact of the project be evaluated after its completion?
4. What ethical issues may arise?
5. What results were achieved through the use of innovative technologies and methods during the project?

Situational task №9

The regional hospital of the city of Shymkent plans to implement a medical project entitled "Prevention of Infectious Diseases." Within the framework of this project, new diagnostic methods and treatment approaches are to be introduced, as well as an awareness-raising campaign aimed at preventing the spread of infectious diseases. Project participants include patients, healthcare professionals, and members of the research team. During project implementation, issues arise related to informing participants, protecting their personal data, and obtaining voluntary informed consent for participation. Representatives of various social and ethnic groups are involved in the project. Some participants express concerns regarding the confidentiality of personal information and the potential risks associated with participation in the study. In addition, there are issues related to assessing the objectivity of research results and the potential for conflicts of financial interest. Throughout the implementation of the project, consideration of ethical issues and protection of the rights of each participant constitute one of the primary objectives.

Project objectives:

1. To improve methods for the prevention and treatment of infectious diseases.
2. To protect patients' personal data and ensure confidentiality.
3. To ensure the objectivity of research results and protect the rights of participants.
4. To ensure equal rights of social groups participating in the project.

Questions:

1. How should the process of informing patients participating in the project be organized?
2. What measures should be taken during the project to prevent harm to the health of research participants?
3. How can the protection of patients' personal data be ensured?
4. What measures should be considered to uphold the principle of justice among research participants?
5. What is the role of the ethics committee during the implementation of the project?

Chapter 3. ASSESSMENT OF PROJECT ACTIVITIES

Keywords

project assessment, evaluation criteria, rubric, self-assessment, peer assessment, formative assessment, summative assessment, project presentation, project report, project defense, feedback, reflection, quality indicators, portfolio, project outcome, dissemination, lessons learned, project closure, continuous improvement, academic integrity

Learning Objectives

By the end of Chapter 3, the student will be able to:

1. Describe the key criteria and methods used to assess project activities in a healthcare education context.
2. Distinguish between formative (ongoing) and summative (final) assessment approaches and explain when each is appropriate.
3. Apply standardized rubrics to evaluate the quality of a project at each stage of its lifecycle.
4. Conduct a structured self-assessment and peer assessment of project work using defined criteria.
5. Prepare a complete written project report according to academic and professional standards, including an introduction, methodology, results, discussion, conclusions, and recommendations.
6. Design and deliver an effective oral project presentation to a professional audience, incorporating visual materials (slides, posters, or Canva-based infographics).
7. Identify "lessons learned" from a completed project and propose concrete recommendations for improving future projects.
8. Demonstrate understanding of academic integrity principles (authorship, plagiarism avoidance, proper citation) in the context of project reporting.

Algorithm for Achieving Learning Objectives

Follow the steps below sequentially to master the material of Chapter 3:

Step 1 – Activate prior knowledge and connect with Chapters 1–2

Before reading, recall the project you planned in Chapter 1 and the KPIs you defined in Chapter 2. Reflect: How would you know if your project was successful? What would you present as evidence of achievement? Write 3–5 sentences in response.

Step 2 – Study Section 3.1 "Key Criteria and Methods"

Read the section carefully. For each assessment criterion listed, identify a concrete, observable indicator that could be measured in your sample project. Construct a simple evaluation matrix: Criterion | Weight (%) | Measurement Tool | Data Source.

Step 3 – Study Section 3.2 "Assessment of Learners' Project Activities"

Study the rubrics presented in the section and in Appendix 4. Practice applying the rubric to two hypothetical project examples (one strong, one weak) provided in the Case-Based Tasks. Identify specific strengths and areas for improvement in each example.

Step 4 – Practice written project reporting

Using the mini-project you developed across Chapters 1 and 2, draft a 1–2 page project summary report following the structure: Title → Problem Statement → Goal and Objectives → Methods → Results (actual or projected) → Conclusions → Recommendations. Apply the academic integrity principles described in this chapter (proper citation, avoidance of plagiarism).

Step 5 – Prepare and deliver a short oral presentation

Design a 5–7 slide presentation of your mini-project using PowerPoint or Canva. Present it to a partner or small group. Request structured feedback using the peer assessment rubric from Appendix 4. Revise your presentation based on the feedback received.

Step 6 – Conduct a "lessons learned" reflection

Complete a structured reflection: (a) What went well in my project? (b) What would I do differently? (c) What new skills did I develop? (d) What recommendations would I give to a team undertaking a similar project next year? This reflection may be included as an appendix to your project portfolio.

Step 7 – Solve Case-Based Tasks

Complete the Case-Based Tasks at the end of Chapter 3 independently, then compare answers in your study group.

Step 8 – Final self-assessment across all three chapters

Return to the Learning Objectives of all three chapters. Complete the full set of Test Questions (pp. 79–95) under timed conditions (maximum 90 minutes for 85 questions). Check your answers against the Answer Key and identify any topics requiring revision before your final examination.

Evaluation of project activities is the process of analyzing the effectiveness, outcomes, impact, and overall success of an implemented project. This type of evaluation is particularly important in medical, scientific, and social projects, as it allows for determining the extent to which project objectives have been achieved, assessing how resources have been utilized, and identifying directions for future development. Project activity evaluation is conducted at several levels.

1. **Evaluation of project effectiveness and outcomes.** The degree to which project objectives have been achieved is determined. For example, in a medical research project, this may include the assessment of research outcomes, implementation of new methods, or improvements in patients' health indicators. The efficiency of using planned resources and expenditures is analyzed. Compliance with the planned timeline and completion of the project within the established deadlines are monitored.
2. **Evaluation of financial efficiency.** The appropriate and justified use of financial resources allocated to the project is monitored. The contribution of each expenditure to the overall effectiveness of the project is assessed. Measures to optimize financial management and ensure cost savings are identified.
3. **Evaluation of social and environmental impact.** The project's impact on society is examined. For instance, in healthcare projects, the influence on population health indicators is assessed. The project's impact on the environment is also considered, which is particularly important for projects aimed at environmental protection or conservation of natural resources. In addition, the extent to which the project complies with principles of human rights, equality, and social justice is evaluated.
4. **Evaluation of project quality.** The quality and effectiveness of the methodologies, techniques, and standards applied during project implementation are assessed. The quality of the methods used, as well as the consistency between project planning and execution, is analyzed. The satisfaction level, experiences, and perceptions of project participants, such as patients or professionals, are evaluated.
5. **Future recommendations and optimization.** After project completion, its results are analyzed to develop recommendations on how similar projects can be implemented more effectively in the future. Challenges and shortcomings encountered during project implementation are identified, and proposals are formulated to prevent them in subsequent projects.
6. **Audit and independent evaluation.** To ensure that the project has been implemented correctly, evaluations are conducted through independent experts and audits. This approach allows for assessing not only financial reporting but also the overall effectiveness of the project.
7. **Project continuation or completion.** As the project approaches completion, the sustainability and potential scalability of its results are evaluated. If the outcomes are highly successful, the project may be transformed into a long-term initiative. Activities are organized to disseminate and utilize project results within professional or public settings.

Evaluation of project activities is an integral part of the planning and

implementation process, as it ensures maximum project effectiveness and the achievement of high-quality results. Each stage of evaluation addresses different aspects of the project and helps to identify its strengths and weaknesses.

3.1 KEY CRITERIA AND METHODS

The main criteria and methods for evaluating project activities are aimed at assessing project effectiveness, performance, efficiency of cost and resource utilization, social impact, and sustainability. When evaluating a project, it is crucial to define the key criteria and evaluation methods, as they reflect the quality of the project, its performance, and its alignment with stated objectives. The main criteria include project effectiveness, quality of results, efficiency of costs and resources, social and environmental impact, sustainability, as well as innovative and novel aspects.

Effectiveness is measured by comparing the degree of achievement of project objectives with the resources expended. In other words, it indicates how accurately and timely the project has achieved its intended goals. For example, in medical projects, treatment outcomes, patient recovery rates, or the effectiveness of preventive measures are considered.

The quality of results is determined by the extent to which the outcomes obtained after project completion correspond to the project objectives and by their impact on society, healthcare, or other sectors. For instance, in projects focused on the development of new medicinal products, the safety and efficacy of the drug, as well as the results of its clinical application, are assessed.

Cost efficiency reflects how appropriately the planned project budget has been utilized. It evaluates the maximum effectiveness of the project's financial resources.

Social impact demonstrates the project's influence on societal changes, population health, and quality of life. Environmental impact assesses the project's effect on the environment, which is particularly important for projects aimed at environmental protection.

The sustainability of project results indicates the duration over which the outcomes are maintained and their potential for scaling. After project completion, the long-term persistence of its effects is assessed. Examples include the long-term impact and implementation of healthcare projects.

When a project involves the application of new solutions, methods, or technologies, its innovative and novel aspects are evaluated.

The main methods include descriptive methods, analytical methods, cohort studies, case–control studies, randomized controlled trials, placebo-controlled studies, and qualitative assessment methods.

The descriptive method is aimed at collecting and describing all data obtained during the implementation of the project. It is most often applied at the initial stages or when assessing the overall status of the project. For example, this method is used to collect preliminary results of a medical project and to examine the extent of its dissemination or acceptance [16 2p].

The analytical method focuses on analyzing the causes of a disease or condition, risk factors, and associations. It includes comparisons, identification of trends, and in-depth data analysis. For instance, in clinical research, this method is used to determine treatment effectiveness or factors influencing therapeutic regimens.

A cohort study is a method based on long-term observation of a defined group of individuals. It is used to predict project outcomes and to identify influencing factors. For example, this method is applied to assess the long-term effects of a new medicinal product or the spread of infectious diseases in epidemiological studies.

Case–control studies are used to identify disease causes or contributing factors. This method is based on dividing participants into two groups and comparing various exposure factors. For example, by comparing lifestyle characteristics or health indicators of affected and healthy individuals, factors influencing disease development can be identified.

Randomized controlled trials are based on evaluating the effectiveness of a new treatment or therapeutic approach by testing it in randomized and controlled groups. For example, such studies are conducted to provide evidence for the efficacy of a new drug or treatment method.

In placebo-controlled studies, one group receives a new drug or treatment method, while the other group receives a placebo (an inactive substance). This method helps to determine the true effectiveness of the treatment and is widely used in clinical trials of new medicinal products.

Qualitative assessment methods are aimed at evaluating the social and psychological aspects of a project. Conducting interviews with participants, focus group discussions, and surveys makes it possible to assess project effectiveness from the perspective of participants' experiences and perceptions.

The methods and criteria for evaluating project activities enable a comprehensive assessment of project outcomes. Each method has its own advantages and limitations; therefore, the combined application of several methods may be the most effective approach. The evaluation process is aimed at determining project effectiveness, social impact, financial outcomes, and long-term sustainability.

3.2 ASSESSMENT OF LEARNERS' PROJECT ACTIVITIES.

Evaluation of students' project activities is an important component of the educational process. This evaluation is aimed at determining students' ability to apply acquired knowledge in practice, their research and creative skills, their teamwork competencies, as well as their level of personal development.

During the evaluation of students' project activities, several key aspects are taken into account. First of all, the relevance of the project and the level of understanding of the topic are assessed, reflecting students' ability to recognize the significance of the chosen topic and to conduct an in-depth investigation. Proper selection and application of research methods, as well as the reliability and accuracy of the obtained data, play a crucial role. Special attention is paid to the creative execution of the project and the degree of innovation introduced, as these demonstrate students' capacity for innovative thinking.

The structural logic of the project, completeness of topic coverage, and coherence between sections are also among the main evaluation criteria. In addition, teamwork skills are considered important, including appropriate distribution of responsibilities among group members, assumption of responsibility, and effective interpersonal interaction. The quality of project documentation is also taken into account, including the accuracy and content quality of written reports, research diaries, and visual materials.

At the project defense stage, students' ability to present material clearly and systematically, the visual quality of the presentation, and the level of responses to questions are assessed. Furthermore, the social or practical significance of the project—namely its impact on society, science, or education, as well as its potential for practical application—is of considerable importance.

Evaluation methods include observation of students' activities during project implementation, analysis of written reports, assessment of performance during presentations and defenses, as well as self-assessment and group assessment. In addition, independent expert evaluation enhances the objectivity of the results. Evaluation outcomes are discussed jointly with students, allowing identification of achievements and areas requiring improvement. All of this contributes to the further development of students' skills in future projects.

Evaluation of students' project activities is carried out using several methods. First and foremost, observation of students' work during project implementation is essential, as it allows assessment of task performance quality and speed, as well as the level of responsibility. Analysis of written reports is also a significant component of evaluation, as it reflects how carefully students have documented their research activities [26 4p].

The presentation and defense stage is one of the key components of the project. At this stage, students' ability to present their work clearly and logically, to visually demonstrate material, and to respond to questions is evaluated. In addition, self-assessment and peer assessment help to determine students' capacity for critical

reflection on their own achievements and shortcomings.

The involvement of experts in the evaluation process plays an important role. Independent assessment by subject-matter specialists or instructors makes it possible to objectively determine the quality of the project. All these methods are aimed at a comprehensive evaluation of students' knowledge, skills, and attitudes toward project-based activities (Table 3).

Table 3. Example of Criteria for Evaluating Project Results

Criteria	*Description*	*Points*
1) Identification of the problem situation and research relevance	The problems are clearly formulated, scientifically substantiated, and logically interconnected. The relevance of the research topic is convincingly justified.	*15–20*
	The problems are formulated and substantiated. The relevance of the research topic is justified.	*10–14*
	The problems are partially formulated. The relevance of the research topic is justified.	*5–9*
	The problems are not formulated or are formulated superficially; the relevance of the topic is not evident.	*0–4*
2) Formulation of the project goal and definition of objectives	The goal is clearly and concisely formulated. The objectives fully correspond to the stated goal.	*15–20*
	The goal is formulated but overly detailed. The objectives correspond to the goal.	*10–14*
	The goal is formulated vaguely. The objectives partially correspond to the goal.	*5–9*
	The goal is not formulated or is unclear. The objectives do not correspond to the goal.	*0–4*
3) Selection and use of literature	The most relevant publications/research studies from full-text databases and reputable sources are used. References are consistently indicated numerically in the text.	*15–20*
	Publications/research studies from a limited number of full-text databases are used. References are indicated numerically in the text.	*10–14*
	Mainly publicly available Internet sources are used. Full-text databases and reputable journals are rarely used. Most sources do not correspond to the project topic. References are absent.	*5–9*
	Full-text databases and reputable journals are not used. Most sources do not correspond to the project topic. References are absent.	*0–4*
4) Timely submission of interim results	Project results are systematically published on the Trello board. Interim results are submitted on time.	*15–20*
	Project results are periodically published on the Trello board. Interim results are submitted on time.	*10–14*
	Project results are published irregularly. Interim results are submitted late.	*5–9*
	Project results are not published on the Trello board. Interim results are not submitted on time.	*0–4*
5) Individual	A collective creative approach to problem-solving is	*15–20*

contribution and creative approach	demonstrated; roles are evenly distributed and teamwork is well coordinated.	
	Even distribution of roles and generally coordinated teamwork are observed.	*10–14*
	Roles are unevenly distributed; teamwork coordination is insufficient.	*5–9*
	Formal participation is observed; collective interaction is absent.	*0–4*
Criteria	*Description*	*Points*
6) Depth of project topic disclosure	The topic is fully disclosed; profound knowledge beyond the curriculum is demonstrated during the defense. Research methods are described, and approaches to achieving objectives are substantiated. Scientific terminology is used fluently. Modern research methods are applied.	*15–20*
	The topic is disclosed within the curriculum framework. Research methods are described; scientific terminology is used to a limited extent. The text is logically structured.	*10–14*
	The topic is partially disclosed. The project description is incomplete. Scientific terminology is not used. The text is presented in a disorganized manner.	*5–9*
	The topic is not disclosed. The project description is incomplete. Scientific terminology is not used. The text is chaotic.	*0–4*
7) Objectivity and reliability of results and their practical significance	The results fully reflect the conducted research, are objective and reliable. Tables, figures, and formulas are provided. The application of results and target users are clearly indicated.	*15–20*
	The results are objective and reliable; tables, figures, and formulas are provided, but practical application and target users are not indicated.	*10–14*
	The results partially reflect the research. Tables, figures, and formulas are insufficient.	*5–9*
	The results do not reflect the research, are unreliable and non-objective. Tables, figures, and formulas are absent or insufficient.	*0–4*
8) Formulation of conclusions	The conclusions are correctly formulated, well substantiated, and fully reflect the research results.	*15–20*
	The conclusions are correctly formulated and substantiated but reflect the research results only partially.	*10–14*
	The conclusions are incomplete, insufficiently substantiated, and partially reflect the research results.	*5–9*
	The conclusions are incorrectly formulated, not substantiated, and do not reflect the research results.	*0–4*
9) Achievement of the project goal and completion of objectives	The project goal has been fully achieved. All stated objectives have been completely fulfilled.	*15–20*
	The project goal has generally been achieved. Not all objectives have been fully fulfilled.	*10–14*

	The project goal has been partially achieved.	*5–9*
	The project goal has not been achieved. The objectives have been partially fulfilled or not fulfilled.	*0–4*
10) Compliance with formatting requirements and project defense	The project includes and fully discloses all required sections. The text is logical, concise, and linguistically accurate. Technical formatting requirements are met. The presentation is clear and visual. During the defense, the presenter demonstrates professional competence and presentation skills.	*15–20*
	All sections are included. The text is logically structured but contains grammatical and stylistic errors. Technical formatting requirements are partially met. The presentation lacks clarity. The presenter demonstrates professional awareness during the defense.	*10–14*
	All sections are included, but logical consistency is not always maintained. Grammatical and stylistic errors are present. Technical requirements are not met. The presentation is unclear. The presenter does not demonstrate in-depth knowledge of the topic.	5–9
	Not all sections are included. Logical structure is violated. Numerous grammatical and stylistic errors are present. Technical requirements are not met. The presentation is unclear. During the defense, the presenter demonstrates insufficient knowledge and has difficulty answering questions.	0–4

Situational tasks for knowledge assessment

Situational task №1

You are implementing a project aimed at improving public health. Within the project, various responsibilities are distributed among group members: some organize vaccination awareness campaigns, others conduct surveys in public places, while others analyze research results. However, misunderstandings have arisen among some group members. They experience difficulties in establishing effective interaction and feel that each member is not fully performing their assigned duties. This may have a negative impact on the project outcomes.

Questions:

1. What measures can be taken to improve communication and interaction among group members?
2. How can the contribution of each student to the project be effectively assessed and responsibilities appropriately distributed?
3. What are the benefits of organizing regular project meetings, and how should they be planned?

Situational task №2

Various difficulties emerged between the training schedule and task execution, resulting in delays of some training sessions. Due to poorly organized information exchange between project teams, misunderstandings in the workflow increased, which affected the project outcomes.

Questions:

4. How can risks arising during the project be identified and a risk management plan developed?
5. What strategies should be applied to establish effective communication among team members?
6. What tools or methods can be used to address information exchange issues during the project?

Situational task №3

A group of medical students is implementing a project aimed at developing a new vaccine against the COVID-19 pandemic. To identify the project's strengths and weaknesses, as well as its opportunities and threats, they decided to apply the SWOT analysis method. The students are experiencing difficulties in accurately evaluating various aspects of the project using SWOT analysis. They face challenges in clearly identifying the project's weaknesses and in appropriately assessing opportunities and threats.

Questions:

6. What are the main difficulties encountered when applying the SWOT analysis method?
7. Which criteria should be considered when identifying the weaknesses of a project?
8. Which opportunities can be effectively utilized in a COVID-19 vaccine

development project?
9. What impact may the early identification of threats have on project outcomes?
10. How can the results of SWOT analysis be integrated into the project's strategic plan?

Situational task №4

In the city of Shymkent, a new medical project entitled "Safe Health" has been launched. The project is being implemented with the aim of preventing infectious diseases, improving treatment methods, and enhancing the efficiency of the healthcare system. The project includes the introduction of new diagnostic methods and medicinal products, the use of telemedicine systems, public health activities, and awareness-raising initiatives. The project was implemented over a period of six months, during which several clinical trials were conducted in hospitals and outpatient healthcare facilities to collect initial results. Within the framework of the project, new methods and technologies were introduced, and informational campaigns were organized for the local population. At each stage, the project must be evaluated from both financial and social perspectives.

Project objectives:

5. To improve the prevention and treatment methods of infectious diseases.
6. To increase the efficiency of healthcare services.
7. To conduct public awareness activities on infectious diseases among the population.
8. To enhance financial efficiency and reduce costs.

Questions:

6. What impact did the new diagnostic methods and treatment approaches introduced within the project have?
7. Assess the financial expenditures of the project.
8. How can the long-term impact of the project be evaluated after its completion?
9. What ethical issues may arise during project implementation?
10. What outcomes were achieved through the use of innovative technologies and methods during the project?

CONCLUSION

The teaching and methodological manual *"Fundamentals of Project-Based Activities"* is aimed at developing project thinking, organizational skills, and research culture among undergraduate students. The manual systematically presents the theoretical foundations of project-based activities, the specific features of research projects in the medical field, as well as methods for evaluating students' project work.

The first chapter comprehensively examines the essence of organizing project-based activities, project structure, stages, planning methods and tools, and presents situational tasks designed to develop students' practical skills. The content of this chapter facilitates the formation of students' abilities to initiate project activities, plan projects, and organize their implementation.

The second chapter describes the types of research projects in the medical field, scientific research methods, effectiveness criteria, ethical standards, and their practical significance. The inclusion of situational tasks is aimed at enhancing students' skills in planning research projects, collecting and analyzing data, and conducting activities in compliance with ethical requirements.

The third chapter focuses on the methods and criteria for evaluating students' project-based activities. The transparency, objectivity, and competency-oriented approaches to assessment contribute to improving the quality of the educational process. In addition, the inclusion of control tasks and test questions makes it possible to determine the level of students' mastery of the educational material.

The supplementary materials, test assignments, and reference list presented at the end of the manual complement the learning content and create conditions for in-depth theoretical and practical mastery of project-based activities. The teaching and methodological manual represents an important educational resource aimed at fostering students' project culture, developing research skills, and enhancing their ability to make well-reasoned decisions in professional practice.

Test Questions

1. A project to open a new laboratory department at a university clinic is planned. The project team aims to install modern equipment, train staff, and establish workflow within six months. What is the key characteristic of this project?
A) It becomes a permanently unchanged structure
B) It continues as an unlimited long-term activity
C) It is focused only on financial reporting
D) It is equivalent to employees' daily routine work
E) It is temporary and must be completed within a defined time frame

2. Medical faculty students initiated a research project on "Antibiotic Resistance." The project goal is to survey 200 patients and statistically analyze the data within three months. How is the *Time-bound* principle of SMART reflected in this project?
A) Selecting the appropriate methodology
B) Determining the number of participants
C) Describing the project's significance
D) Setting a three-month deadline to achieve results
E) Collecting only qualitative data

3. In a project to strengthen infection control at a city hospital, the team faced a budget shortage. The project leader decided to reallocate resources and seek additional funding. Which aspect of project management is demonstrated?
A) Physicians' private practice
B) Routine administrative work
C) Conducting only scientific research
D) Risk management
E) Organization of the educational process

4. A student group launched a project titled "Raising Public Awareness of Diabetes." They planned to conduct a social survey, analyze the results, and distribute informational leaflets. What type of project is this?
A) An individual student initiative
B) A project aimed at strengthening public health
C) Unlimited scientific research
D) A new drug development project
E) A randomly conducted activity

5. Hospital doctors initiated a project to test a new surgical technique. The project includes clinical trials and publication of results in a scientific journal. What is the main objective of this project?
A) Conducting a financial audit
B) Routine patient monitoring only
C) Doctors' usual daily work
D) Writing administrative reports
E) Introducing a new medical method

6. During project planning, team members distributed tasks: one collected literature, another conducted surveys, and another prepared reports. Which project stage does this represent?
A) Information collection only
B) Presentation of results

C) Conclusion
D) Planning stage
E) Monitoring stage

7. In a medical research project, students searched for recent scientific articles on infectious diseases and collected statistics. Which step does this describe?
A) Risk management
B) Project defense
C) Preparing a presentation
D) Information collection
E) Project completion

8. A project goal was defined as “establishing a new microbiological laboratory within six months.” Which SMART requirements does this goal meet?
A) Specific, Measurable, Achievable, Relevant, Time-bound
B) Theoretically grounded only
C) A goal without time constraints
D) Limited to individual initiative
E) A meaningless goal

9. University students initiated a project titled “Studying Public Attitudes Toward Vaccination.” They conducted a survey and analyzed the results using Google Forms. Which tool was used?
A) Handwritten notebooks only
B) Traditional medical methods
C) A digital survey platform
D) Routine medical reports
E) Clinical surgery

10. During the project, fewer participants than planned completed the survey. The project leader decided to recruit additional participants. What does this management action represent?
A) Adjusting the project plan
B) Publishing conclusions
C) Terminating the project
D) Cutting the budget
E) Concealing results

11. In a hospital research project, errors were identified during data analysis. The team rechecked and corrected the results. Which project stage does this belong to?
A) Budget allocation
B) Goal setting
C) Planning
D) Project initiation
E) Results analysis

12. Medical students conducted a project titled “Mask-Wearing Culture During COVID-19” by observing city residents. Which research method was applied?
A) Clinical trial
B) Survey method
C) Laboratory research only
D) Financial analysis
E) Personal opinion collection

13. To present project results to the audience, students prepared a presentation including charts and tables. Which project stage does this indicate?
A) Risk management
B) Information collection
C) Planning
D) Presentation of results
E) Financing

14. A city clinic launched a project titled “Prevention of Childhood Obesity.” Lectures were delivered at schools, and sports activities were organized. What was the project’s objective?
A) Administrative reporting
B) Improving public health
C) Gaining individual clinical experience
D) Testing new drugs only
E) Limiting the project to theoretical research

15. A project goal stated: “Increase the number of blood donors in the city by 20% within one year.” Which SMART element is explicitly demonstrated?
A) Achievable
B) Specific
C) Measurable
D) Relevant
E) Time-bound

16. During a research project, obtaining informed consent from participants was required. Which aspect of project activity does this relate to?
A) Ethical requirements
B) Financial planning
C) Practical methods
D) Administrative decisions
E) Scientific reporting only

17. Students used the Trello platform to organize project stages into “Planning,” “In Progress,” and “Completed.” What type of tool is this?
A) Clinical protocol
B) Medication list
C) Project management platform
D) Personal diary
E) Theoretical tool

18. Some project tasks were completed late. The team leader identified delays using a Gantt chart. What is the main advantage of this tool?
A) Purchasing laboratory equipment
B) Budget planning only
C) Creating physicians’ schedules
D) Allocating library resources
E) Visual time tracking

19. The project goal was defined as “Increasing tuberculosis vaccination coverage among rural residents by 10% within six months.” What is the key feature of this goal?
A) Specific and measurable
B) Timeless

C) Purely theoretical
D) Unrealistic
E) Uncontrolled

20. Students exchanged opinions and discussed research questions on the Pig Chat platform. Which skill does this activity develop?
A) Communication skills
B) Individual written reporting
C) Financial accounting
D) Laboratory analysis
E) Monitoring only

21. In a medical research project, the Cochrane Library database was used for data collection. What type of resource is this?
A) Oral narratives
B) Personal opinion collections
C) Social media posts
D) Newspaper articles
E) International scientific electronic library

22. The project leader identified potential risks in advance and implemented mitigation measures. What is this management action called?
A) Risk management
B) Project completion
C) Plan approval
D) Financial control
E) Drawing conclusions

23. In a project to increase awareness of HIV/AIDS, students developed and distributed informational leaflets in schools. What type of outcome is this?
A) Informational and educational product
B) Financial report
C) Clinical trial
D) Administrative order
E) Theoretical conclusion

24. One of the project methods was conducting interviews. What type of data does this method provide?
A) Qualitative information
B) Quantitative data only
C) Financial reports
D) Budget plans
E) Drug formulas

25. The final project report described all stages, objectives, methods, challenges, and results. What document is this?
A) Administrative order
B) Comprehensive project report
C) Personal research notebook
D) Financial statement
E) Individual presentation

26. Medical students conducted group trainings in a project titled “Mental Health Support.” Which project outcome does this represent?
A) Administrative control
B) Financial profit
C) Scientific research only
D) Social impact
E) Reporting only

27. Statistical methods were used to assess the effectiveness of project results. Which stage does this correspond to?
A) Plan adjustment
B) Goal setting
C) Planning
D) Defense
E) Results analysis

28. During project defense, students presented their results and answered questions. Which project stage is this?
A) Goal setting
B) Planning only
C) Information collection
D) Risk management
E) Defense stage

29. Students clearly described the methods used in the project (survey, interview, observation). In which section should this appear?
A) Research methods
B) Financial report
C) Personal diary
D) Theoretical conclusions only
E) Administrative act

30. Recommendations were developed based on project results for future projects. What is the purpose of this action?
A) Applying administrative sanctions
B) Terminating the project
C) Reducing funding
D) Improving project effectiveness
E) Closing reports only

31. Hospital management initiated a project to implement a new electronic health system. The project included digitizing patient records, training physicians, and implementing information security measures. What should be the main outcome of this project?
A) Improving the quality of healthcare services
B) Increasing physicians’ personal income
C) Reducing paper-based documentation only
D) Changing employees’ salaries
E) Conducting a one-time activity

32. In a medical research project, students collected data from 500 people to assess disease prevalence and used Excel to systematize the data. What activity does this represent?
A) Data processing

B) Planning stage only
C) Defense stage
D) Organizing budget allocation
E) Project closure

33. One of the key stages of a project is defining objectives. A university launched a project titled "Increasing Students' Physical Activity." The goal was set as "Increasing participation in sports clubs by 25% within six months." What is the advantage of this goal?
A) It is ineffective
B) It is overly generalized
C) It lacks a time frame
D) It is clearly formulated according to SMART principles
E) It is meaningless

34. Interviews were selected as a research method. Students collected opinions from healthcare professionals and obtained qualitative information. What type of data does this method provide?
A) Qualitative data
B) Quantitative data only
C) Financial reports
D) Administrative orders
E) Clinical protocols

35. An educational institution implemented a project titled "Application of Artificial Intelligence in Public Health." Tools such as ChatGPT were used to facilitate literature analysis. What is the innovative feature of this project?
A) Financial reporting
B) Recording data in paper notebooks
C) Conducting surveys only
D) Routine observation methods
E) Use of artificial intelligence tools

36. During the project, team members failed to perform their roles clearly, causing task delays. The project leader reassigned responsibilities. What is this management action called?
A) Reorganization of the plan
B) Project completion
C) Reporting only
D) Changing project objectives
E) Budget reduction

37. A project titled "Reducing Smoking in the Population" was conducted in public health. Anti-smoking video clips were shown to residents. What type of project outcome is this?
A) Purely theoretical work
B) Administrative documentation only
C) Informational and educational outcome
D) Individual clinical protocol
E) Financial gain

38. Some project participants failed to work on time, resulting in project delays. The team leader introduced motivational measures. Which aspect of project management does this relate to?
A) Team management
B) Project termination

C) Budget allocation
D) Issuing administrative orders
E) Statistical analysis only

39. During project defense, students presented results using tables and graphs. Which stage does this represent?
A) Presentation of results
B) Information collection
C) Planning
D) Method selection
E) Risk analysis

40. During the planning stage, specific timelines were assigned to each task. What was the main advantage of using a Gantt chart?
A) Writing drug formulas
B) Budget allocation only
C) Maintaining a personal diary
D) Visual representation of the work schedule

41. In the project "Rational Use of Antibiotics," physicians received training. Which project outcome does this activity represent?
A) Enhancement of professional knowledge
B) Financial reporting only
C) Administrative documentation
D) Theoretical research
E) Individual experience

42. Written consent was obtained from participants during a survey in a research project. What does this requirement indicate?
A) Compliance with ethical standards
B) Financial control
C) Administrative decision
D) Statistical analysis only
E) Theoretical reporting

43. Medical students conducted practical sessions with schoolchildren in the project "Compliance with Hygienic Practices." What is the outcome of this project?
A) Theoretical conclusions
B) Financial profit
C) Administrative reporting only
D) Laboratory research
E) Behavioral change in society

44. To improve project effectiveness, the leader held weekly team meetings. What is the purpose of this management action?
A) Project termination
B) Documentation only
C) Budget reduction
D) Strengthening communication
E) Issuing administrative orders

45. What is the main purpose of using SWOT analysis in a project?
A) Identifying strengths and weaknesses of the project
B) Budget allocation
C) Personal reporting
D) Issuing administrative orders
E) Conducting laboratory analysis

46. In the project “Healthy Nutrition Culture Among Adolescents,” survey results were presented in diagrams. Which project stage does this illustrate?
A) Presentation of results
B) Planning
C) Method selection
D) Risk forecasting
E) Writing conclusions

47. The project leader identified errors during implementation and made decisions to correct them. What type of management action is this?
A) Closure
B) Planning
C) Project monitoring and control
D) Administrative act
E) Budget allocation

48. In the project “Reducing Internet Addiction Among Youth,” seminars were conducted for parents. How can the project outcome be described?
A) Aimed at strengthening public health
B) Financial gain
C) Administrative documentation only
D) Theoretical literature review
E) Laboratory experimentation

49. What is the main advantage of using Google Forms as a project tool?
A) Automation of data collection
B) Paper-based data recording
C) Administrative reporting
D) Budget allocation
E) Personal diary keeping

50. Students demonstrated the impact of project results on public health through analysis. Which stage does this belong to?
A) Conclusion stage
B) Planning
C) Method selection
D) Risk forecasting
E) Project initiation

51. In the project “Tuberculosis Prevention,” physicians visited rural areas and conducted free screenings. What type of project outcome is this?
A) Practical and applied outcome
B) Financial reporting
C) Individual laboratory experiment

D) Administrative order
E) Theoretical conclusion

52. During the project, participants failed to exchange information in a timely manner, delaying results. What is the best solution?
A) Introducing a communication plan
B) Project termination
C) Reporting only
D) Budget reduction
E) Issuing an administrative act

53. Why is it important to include recommendations in the final project report?
A) For administrative submission only
B) To reduce funding
C) To improve future projects
D) For routine documentation
E) As a laboratory report

54. The project leader presented project results at a conference. What does this action demonstrate?
A) Presentation of project results
B) Information collection
C) Planning only
D) Administrative act
E) Monitoring

55. Approval from an Ethics Committee was required during the project. Why is this necessary?
A) To protect participants' safety
B) Financial reporting
C) Administrative documentation only
D) Purchasing laboratory equipment
E) Statistical analysis

56. Some indicators were lower than expected during result analysis. What action is required?
A) Revising and adjusting results
B) Project closure only
C) Budget reduction
D) Issuing an administrative order

57. In the project "Promoting a Healthy Lifestyle Among Youth," video materials were distributed via social media. How can these results be described?
A) Informational and educational
B) Financial gain
C) Administrative reporting
D) Laboratory experimentation
E) Theoretical conclusions

58. Project expenses exceeded the planned budget. How should the team address this issue?
A) Issuing an administrative act
B) Project termination
C) Concealing financial use
D) Revising the budget
E) Reporting only

59. Students used the Canva platform to visually present project results. What is the main advantage of this tool?
A) Budget allocation
B) Creating visual presentations
C) Administrative reporting
D) Personal diary keeping
E) Laboratory equipment

60. Experience gained during the project was applied in subsequent activities. What is the significance of this?
A) Improving project effectiveness
B) Project termination
C) Budget reduction
D) Issuing administrative orders
E) Individual reporting

61. A hospital launched a project titled “Prevention of Cardiovascular Diseases,” including free screenings, lectures, and informational materials. What should be the main outcome?
A) Improvement of public health
B) Financial profit
C) Administrative documentation
D) Individual laboratory experience
E) Theoretical literature review

62. In a research project, students processed survey data using SPSS software. What activity does this represent?
A) Conducting statistical analysis
B) Planning stage only
C) Project defense
D) Budget allocation
E) Administrative action

63. A university launched a project titled “Immunity Against Infections.” The specific goal was “to assess immune status in 500 students within one year.” What is the advantage of this goal?
A) It is time-bound according to SMART principles
B) It is generalized
C) It lacks a time frame
D) It is unrealistic
E) It is a paper-based concept only

64. Focus groups were selected as a research method. Students held discussions with patients and analyzed their experiences. What type of data does this method provide?
A) Administrative documents
B) Quantitative data
C) Financial reports
D) Qualitative data
E) Theoretical analysis

65. In the project “Increasing Confidence in Vaccination,” an informational campaign was conducted via social media. What is the innovative feature of this project?
A) Traditional lectures

B) Distribution of paper leaflets
C) Medical consultations only
D) Use of digital platforms
E) Individual experience collection

66. The project team failed to complete tasks on time. The leader created a new schedule and set specific deadlines. What management action is this?
A) Plan revision
B) Project closure
C) Issuing an administrative act
D) Budget reduction
E) Writing a theoretical report

67. In the “Healthy Nutrition” project, seminars on proper diet planning were conducted for residents. How can this outcome be described?
A) Administrative reporting
B) Financial gain
C) Social and educational impact
D) Laboratory research
E) Individual clinical experience

68. Some project participants were inactive. The leader conducted a motivational training session. Which management method does this represent?
A) Team motivation
B) Budget allocation only
C) Issuing administrative orders
D) Project termination
E) Concealing the plan

69. Students presented project results using tables and diagrams. Which stage does this indicate?
A) Risk analysis
B) Information collection
C) Planning
D) Presentation of results
E) Administrative action

70. During project planning, start and end dates were defined for each task. Which tool was used?
A) Gantt chart
B) Excel spreadsheet
C) Paper diary only
D) Administrative order
E) Clinical protocol

71. In the project “Strengthening Infection Control,” staff completed specialized training courses. What was the project outcome?
A) Improvement of staff professional skills
B) Financial reporting
C) Personal research notes
D) Administrative act
E) Theoretical literature review

72. Written consent was obtained from participants during a survey. What does this indicate in the project?
A) Planning
B) Budget allocation
C) Compliance with ethical standards
D) Issuing administrative acts
E) Theoretical analysis

73. In the project “Increasing Sports Activity Among Youth,” football and volleyball competitions were organized. How can the project outcome be described?
A) Improvement of social behavior
B) Financial gain
C) Administrative reporting
D) Laboratory experimentation
E) Theoretical conclusions

74. The project leader held daily online meetings with the team. What type of management does this represent?
A) Ensuring communication
B) Reporting only
C) Budget reduction
D) Issuing administrative orders
E) Changing project objectives

75. SWOT analysis identified weaknesses within the project team. Why was this analysis conducted?
A) To conduct laboratory testing
B) To allocate budget
C) To maintain a personal diary
D) To issue administrative acts
E) To evaluate strengths and weaknesses

76. In the project “Proper Handwashing Culture,” practical lessons were conducted for schoolchildren. What type of outcome is this?
A) Laboratory experiment
B) Financial gain
C) Administrative reporting
D) Strengthening public health
E) Theoretical analysis

77. Errors were identified during the project, and corrective decisions were made. What is this management action called?
A) Budget reduction
B) Planning
C) Closure
D) Project monitoring and control
E) Theoretical conclusions

78. In the project “Reducing Internet Addiction,” training sessions were conducted for parents. What is the outcome of this project?
A) Improvement of public health

B) Financial gain
C) Administrative act
D) Laboratory research
E) Theoretical literature

79. What is the advantage of conducting surveys using Google Forms?
A) Writing administrative documents
B) Paper-based data collection
C) Budget allocation
D) Automatic data collection
E) Laboratory equipment

80. In the project "Prevention of Eye Diseases Among Children," results were statistically analyzed and conclusions were drawn. Which stage does this represent?
A) Finalization of results
B) Goal setting
C) Planning
D) Risk forecasting
E) Project closure

81. Free medical screenings were organized for rural residents during the project. What type of outcome is this?
A) Practical and applied outcome
B) Financial gain
C) Administrative act
D) Theoretical conclusion
E) Laboratory research

82. Project team members failed to exchange information. How can this issue be resolved?
A) Project termination
B) Introducing a plan
C) Budget reduction
D) Issuing an administrative act
E) Writing a theoretical report

83. Recommendations were included in the final project report. What is their purpose?
A) Improving future projects
B) Administrative submission only
C) Budget reduction
D) Routine documentation
E) Laboratory reporting

84. The project leader presented results at an international conference. What does this indicate?
A) Budget allocation
B) Planning
C) Information collection
D) Presentation of results
E) Issuing an administrative act

85. Approval from an Ethics Committee was required for a medical project. Why is this necessary?
A) To protect participants' rights
B) Financial reporting

C) Administrative documentation
D) Purchasing laboratory equipment
E) Statistical analysis

Test Answers

№	Correct Answer	№	Correct Answer	№	Correct Answer	№,	Correct Answer
1	E	23	A	45	E	67	C
2	D	24	A	46	A	68	A
3	D	25	B	47	C	69	D
4	B	26	D	48	A	70	A
5	E	27	E	49	A	71	A
6	D	28	E	50	A	72	C
7	D	29	A	51	A	73	A
8	A	30	D	52	A	74	A
9	C	31	A	53	C	75	E
10	A	32	A	54	A	76	D
11	E	33	D	55	A	77	D
12	B	34	A	56	A	78	A
13	D	35	E	57	A	79	D
14	B	36	A	58	D	80	A
15	C	37	C	59	B	81	A
16	A	38	A	60	A	82	B
17	C	39	A	61	A	83	A
18	E	40	D	62	A	84	D
19	A	41	A	63	A	85	A
20	A	42	A	64	D		
21	E	43	E	65	D		
22	A	44	D	66	A		

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RECOMMENDED FURTHER READING

Books

1. Project Management Institute. *A Guide to the Project Management Body of Knowledge (PMBOK® Guide).* 7th ed. Newtown Square, PA: PMI; 2021. 370 p. ISBN: 978-1628256642.

2. Kerzner H. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling.* 13th ed. Hoboken: Wiley; 2022. 1296 p. ISBN: 978-1119165354.

3. Greenhalgh T. *How to Read a Paper: The Basics of Evidence-Based Medicine and Healthcare.* 7th ed. Oxford: Wiley-Blackwell; 2023. 272 p. ISBN: 978-1119484745.

4. Creswell J. W., Creswell J. D. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* 6th ed. Thousand Oaks: SAGE Publications; 2023. 304 p. ISBN: 978-1071817940.

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Official Educational Websites

1. **World Health Organization — Research & Publications** https://www.who.int/publications The official WHO portal providing guidelines, reports, and methodological materials on medical research and healthcare project management.
2. **Cochrane Library** https://www.cochranelibrary.com The leading database of systematic reviews and meta-analyses; an essential resource for evidence-based medicine and clinical research projects.
3. **PubMed / MEDLINE (National Library of Medicine, USA)** https://pubmed.ncbi.nlm.nih.gov The world's largest biomedical literature database with over 35 million articles covering medicine, nursing, dentistry, and related health sciences.
4. **Project Management Institute (PMI) — Learning** https://www.pmi.org/learning The official PMI educational resource offering articles, webinars, and internationally recognized project management standards and frameworks.
5. **Association for Medical Education in Europe (AMEE)** https://amee.org An international organization publishing guidelines and resources on project-based learning methodologies in medical and healthcare education.
6. **OECD iLibrary — Education** https://www.oecd-ilibrary.org/education Reports and analytical materials from the OECD on innovation in higher education, project competencies, and educational policy development.
7. **Coursera — Project Management & Research Methods** https://www.coursera.org An accredited online learning platform offering courses from leading universities (Johns Hopkins, University of Michigan, Google) on project management and research methods.
8. **edX — Healthcare & Project Management Courses** https://www.edx.org Online courses from Harvard University, MIT, and other institutions covering project management, research methodology, and digital health innovations.
9. **Khan Academy — Research & Statistics** https://www.khanacademy.org/math/statistics-probability A free educational platform providing learning materials on statistics, probability, and the fundamentals of scientific research.
10. **ClinicalTrials.gov** https://clinicaltrials.gov A registry of clinical research studies conducted in the United States and worldwide; useful for understanding the structure and design of medical research projects.

Notes for Reference

Appendix №1

Project Program

Project Title	
Department Name	
Project Supervisor	
Problem Statement	A project problem that may generate interest among students (mono- or interdisciplinary), encouraging independent acquisition of knowledge and skills required for future professional activity
Project Goal and Objectives	Goal: Objectives: 1) … 2) …
Project Roadmap	Main activities at each stage of project implementation, timelines, reporting formats
Student Activities / Skills to Be Developed	
Project Implementation Timeline	
Requirements for Students and Project Participants	
Planned Project Outcomes	Project outputs may include: models and layouts, methods, guidelines, presentations, analytical reports, methodological materials, etc.
Number of Project Participants	
Educational Program under Which the Project Is Implemented	

Author(s): _____

The project program was reviewed at a department meeting _____

«____» _____202_ y, minutes №___

Appendix №2

Example of a Project Implementation Action Plan

Stages	Work Content	Students' Activities	Stage Outcome
Motivation and Goal-Setting Stage	– defining the topic; – identifying one or more problems; – clarifying the goals of the final outcome	– understanding the project problem and objectives; – developing the project concept	Concept, idea, and image of the project product. Motivation of project participants to work on the defined problem
Planning Stage	– problem analysis, formulation and justification of hypotheses; – selection of the optimal solution; – identification of information sources and methods of data collection and analysis; – distribution of roles within the team; – goal setting and discussion of evaluation criteria; – determination of result presentation formats	– proposing hypotheses and ideas, formulating tasks; – identifying and refining information sources; – selecting the optimal workflow; – describing the project product; – developing an algorithm to achieve the final result; – distribution of responsibilities	Project task schedule indicating milestones and responsible persons
Project Implementation Stage	– searching for information confirming or refuting the hypothesis; – adjusting the work algorithm based on intermediate results; – project implementation	– working with information; – conducting research activities; – implementing the developed algorithm; – project construction	Completed project product
Project Defense Stage	– analysis of obtained results; – preparation and formatting of the report; – collective project defense	– preparation of reports and presentations; – project defense	Public presentation and project defense
Results Evaluation Stage	– analysis of project implementation and achieved results (successes and failures); – analysis of goal achievement; – evaluation of results and identification of new problems	– collective analysis of project results; – self-assessment	Evaluation of students' project activities through analysis of developed competencies

Appendix №3

Sample Title Page Format for a Written Project Report

JSC «South Kazakhstan Medical Academy»

Faculty of Medicine
Department of Microbiology, Allergology, and Immunology

DETERMINATION OF THE MICROBIAL LANDSCAPE OF THE TEACHING CLASSROOMS OF THE «DEPARTMENT OF MICROBIOLOGY, ALLERGOLOGY, AND IMMUNOLOGY»

Project Report

Educational Program: 6B10115 «Medicine»

Project Team Members:
Dovlatov A.,
Nasibova M., Polatova Z. Project Supervisor:
Doctor of Medical Sciences, Professor Seitkhanova B.T.

Shymkent 2025

Appendix №4

Guidelines for Preparing a Project Report

Page format	A4, 210 × 297 mm
Page margins	Left-30 mm, right-10 mm, top and bottom-20 mm
Font	Times New Roman, 14 pt
Line spacing	One and a half
Paragraphs indent	1.25 cm
Text alignment	Justified
Page numbering	Page numbering is carried out using Arabic numerals throughout the entire document. The page number is placed at the bottom center of the page without a period. The title page and the contents page are not numbered; numbering starts from the “Introduction” page with number 3.
Formatting of paragraph and subparagraph titles	Written centered in CAPITAL (UPPERCASE) LETTERS, in bold type, without a period. Numbering is done using Arabic numerals without a period, for example: 1 THEORETICAL FOUNDATIONS OF LABOR MOTIVATION AND INCENTIVE STUDIES Contents, Introduction, Conclusion, List of References, and Appendices are formatted without numbering.
Subparagraph numbering	Written with an initial capital letter, centered, in bold type, without a period. Numbering is done using Arabic numerals; the number includes the section number and the paragraph number separated by a dot, for example: 1.1 Project Activities of Medical Faculty Students: Content, Organization, Presentation of Results Subparagraph numbering includes the section number, subsection number, and the sequential number of the subparagraph, separated by dots, for example: 1.1.1 Features of Project Activities
Spacing between headings and text	Headings are separated from the text by three intervals above (one blank line when using one-and-a-half line spacing) and by setting the spacing below as follows: Paragraph tab / Indents and Spacing / Spacing After / 12 pt.
Beginning of sections	The contents, introduction, each chapter, conclusion, list of references, and appendices must begin on a new page.

Lists in the text	Numbering is done using Arabic numerals. The text is typed with a paragraph indent, for example: Instrumental theories… Content theories… … If another type of numbering is used, such as 1), 2), 3), the text begins with a lowercase letter and ends with a semicolon, for example: identification of internal motivation factors…; identification of employees' expectations…; … In multi-level lists, lowercase Latin letters followed by a parenthesis may be used, for example: 1 hygienic factors: a) salary; b) working conditions; c) … 2 motivational factors: a) …
Formula formatting	The formula design is entered in the Formula Editor as a separate line Formulas are typed using the equation editor on a separate line and centered. Explanations of symbols and numerical coefficients included in the formula, if they have not been previously explained in the text, must be provided directly below the formula. Each symbol should be explained on a new line in the order in which it appears in the formula. The first line of explanations should begin with the word "where" without a colon, for example: Expert assessment refers to ordinal (rank) variables; to analyze the relationship between them, rank correlation coefficients are used, for example, the Spearman correlation coefficient: $\rho = 1 - \frac{\sum(r_x - r_y)^2}{n^3 - n}$ where n — the number of paired observations, $\sum(r_x - r_y)^2$ — the sum of squared rank differences.

Table formatting	All tables are numbered using Arabic numerals (i.e., consecutively) or within sections (in this case, the table number consists of the section number and the sequential table number within the section, separated by a dot, for example: Table 1 or Table 1.1). Each table must be referenced in the text. The text within tables is typed in Times New Roman, 12 pt, lowercase letters, without emphasis, justified, and single-spaced. The table title is formatted with a paragraph indent, justified alignment, and a reference to the source (author). Tables are separated from the text by one interval above and below.
Figure formatting	Figures must be numbered using Arabic numerals. Numbering of illustrations within sections is permitted; in this case, the figure number consists of the section number and the sequential number of the illustration, separated by a dot. The word “Figure” and its title are printed in 12 pt, lowercase letters, bold type, centered, without paragraph indentation, and with a reference to the source (author). If necessary, figures may include a title and explanatory notes (caption text below the figure). For example: The method of labor law consists of labor law regulation methods specific to this field, which are shown in Figure 1. Figure 1 — labor law regulation methods constituting the method of labor law
Appendix formatting	Each appendix must begin on a new page; the word “Appendix” and its designation (title) are placed in the upper right corner of the page. Appendices share the same page numbering sequence as the main body of the document. All appendices must be listed in the table of contents. Illustrations within each appendix are numbered separately using Arabic numerals, with the appendix designation placed before the number. Appendices are designated by capital letters of the Russian alphabet, excluding the letters Е, З, И, О, Ч, Ь, Ы, Ъ. The letter indicating the appendix sequence follows the word “Appendix.” If the document contains only one appendix, it is designated as Appendix A.
Reference citations	The use of footnote bibliographic references is recommended. Reference text should be typed in Times New Roman, 12 pt, lowercase letters, without emphasis, justified, and single-spaced.
	1 Костенко Е. П. Теория управления: эволюция концепций в зарубежных странах. – Ростов н/Д : Содействие XXI век, 2013 – 93 бет. 2 Bator F. M. Th e Simple Analytics of Welfare Maximization // American Economic Review. – 1957 – Vol. 47, № 1 – P. 22–59.

Formatting the list of references	At present, bibliographic entries in the list of references are formatted in accordance with GOST 7.1–2003. Information about sources should be arranged in the order in which references appear in the text, numbered with Arabic numerals without periods, and typed with a paragraph indent. References to cited sources in the text should be given in square brackets. Bibliographic descriptions must be provided in the original language. 1 Abuova G.N., Lizinфельд I.A. Масштабы ВИЧ-инфекции в мире и Южно-Казахстанской области // Наука и образование Южного Казахстана. – 2009. – No. 1 (74). – P. 135–139. 2 Nazarbayev N.A. В потоке истории. – Almaty: Atamura, 1999. – 296 p.