KAPITEL 3 / *CHAPTER 3* [3]
THEORETICAL FOUNDATIONS OF SELF-EDUCATIONAL ACTIVITY OF FUTURE SPECIALISTS IN MEDICAL AND PHARMACEUTICAL FIELDS

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Introduction

The modern development of medical and pharmaceutical education is accompanied by radical changes in approaches to training future healthcare specialists. The growth of professional knowledge, accelerated technological development, and increased quality requirements create new challenges for training physicians, pharmacists, and master's nurses who form the foundation of the healthcare system.

Medical and pharmaceutical education represents a critically important link in healthcare delivery. Improving its effectiveness through intelligent pedagogical technologies, digitalization, and real-time monitoring systems is a strategic task for enhancing national healthcare competitiveness. Recent years have emphasized implementing WHO and FIP international standards, including the "Seven-Star Pharmacist" concept, which establish unified approaches to educational program design and define requirements for graduate competencies and self-educational capacity.

Parallel development of competency-based approaches means transitioning to learning strategies considering not only professional parameters but also lifelong learning ability, self-education readiness, and adaptation to rapid professional environment changes. Successful international examples from Germany, Japan, and the USA demonstrate innovative training systems utilizing cyber-physical systems, artificial intelligence, digital twins, and predictive analytics.

Relevance. Self-educational activity is integral to healthcare specialist professional development. Despite recognized importance, organization of self-educational activity for future medical and pharmaceutical specialists remains

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insufficiently developed theoretically and practically.

Aim: to present comprehensive analysis of theoretical foundations of self-educational activity, summarize international experience, and substantiate pedagogical conditions for effective organization in educational information environments of medical institutions.

Objectives:

1. Analyze self-education phenomenon in contemporary discourse and identify key 21st-century concepts

2. Consider disciplinary perspectives (philosophical, sociological, psychological, pedagogical) and their significance for medical/pharmaceutical education

3. Characterize main organizational approaches in international higher medical/pharmaceutical education practice

4. Summarize modern trends considering digitalization and innovative educational technologies

5. Substantiate specifics of self-educational activity for future physicians, pharmacists, and master's nurses

Scientific novelty: First comprehensive examination of self-educational activity theoretical foundations for three healthcare specialties (medicine, pharmacy, nursing) considering each specialty's specifics and general training patterns; systematization of international approaches to forming self-education skills; substantiation of educational information environment role; definition of pedagogical conditions for effective organization under digitalization conditions.

The work examines the self-education phenomenon through multiple disciplinary lenses, analyzing key concepts including self-directed learning (Malcolm Knowles), andragogy theory, transformative learning (Jack Mezirow), self-regulated learning models (Barry Zimmerman), experiential learning (David Kolb), and reflective practice (Donald Schön). Contemporary trends are identified: digital technology and artificial intelligence roles, continuing professional development integration, neuroscientific understanding development, lifelong learning actualization, interdisciplinary aspects, and personalized support systems.

For medical and pharmaceutical education, self-education acquires special significance through professional activity specifics: rapid knowledge renewal, high patient responsibility, decision-making under uncertainty, continuous development needs, theoretical-practical knowledge integration, critical thinking development, and interdisciplinary teamwork.

Practical significance: Results can be used by teachers to improve educational process organization, develop methodological support, and create effective educational information environments promoting self-education skills development in future physicians, pharmacists, and master's nurses. Materials benefit bachelor's, master's, and educational-scientific level students organizing their own self-educational activity.

Target audience: Higher education students in specialties I2 "Medicine", I8 "Pharmacy, Industrial Pharmacy", I3 "Nursing"; medical and pharmaceutical institution teachers; researchers studying medical/pharmaceutical education problems; educational process organizers; practicing healthcare professionals engaged in continuing professional development.

The phenomenon of self-education in contemporary scientific discourse

3.1 Self-Education as a Response to Contemporary Challenges

The transformation of global socio-economic systems in the 21st century is accompanied by radical changes in the organization of professional training. Modern production structures demonstrate a clear trend toward reducing the duration of workers' separation from the production process for training or retraining purposes. This trend is driven by the intensification of production cycles, increasing cost of working time, and the need to maintain business process continuity. As a result, traditional forms of long-term professional training are giving way to short-term targeted programs characterized by high mobility and rapid adaptation to the specific needs of modern production.

This trend is particularly noticeable in the healthcare sector, where physicians,

pharmacists, and master's nurses face the need for constant knowledge renewal due to the emergence of new medical technologies, medicines, treatment and diagnostic methods, and medical and pharmaceutical care standards. At the same time, opportunities for long-term training with separation from production are limited due to high workload on medical workers and healthcare institutions' needs for continuous service provision to the population.

However, this transformation contains significant risks. Reducing the duration of training programs creates a threat of declining quality of specialist training and retraining, while requirements for their professional activity, qualification level, and personal qualities are in a state of constant growth. For medical and pharmaceutical workers, this means the need to possess not only deep professional knowledge but also the ability to quickly adapt to new treatment protocols, pharmacological innovations, and technological solutions in diagnostics and therapy.

In this context, the ability of healthcare specialists for self-educational activity acquires the status of a critically important professional competency. This places special responsibility on medical and pharmaceutical higher education institutions for forming in students – future physicians, pharmacists, and master's nurses – the proper attitude toward professional knowledge and skills, development of internal need for self-education, and systematic formation of self-educational activity skills as an integral component of professional development.

The specifics of professional activity of medical and pharmaceutical workers determine special requirements for their self-educational activity. Physicians must constantly update knowledge about new diagnostic and treatment methods, follow clinical research results, master new medical technologies and equipment. Pharmacists require systematic study of new medicines, their pharmacological properties, interactions, side effects, as well as changes in legislation regulating pharmaceutical activity. Master's nurses, who perform both direct patient care functions and managerial and educational functions, also require constant professional development through self-education.

3.2 Self-Education in the Global Educational Space

The relevance of the self-education phenomenon is confirmed by the intensity of its research in the contemporary scientific space. Self-education issues are in the focus of attention of both fundamental scientific and popular science publications, as well as specialized digital resources in many countries around the world. Special attention to self-education is paid in the context of medical and pharmaceutical education, as these fields are characterized by rapid knowledge renewal and high requirements for specialists' professional competence.

International educational platforms actively substantiate the advantages of self-education, motivating users for its systematic application. These resources identify key advantages of self-education: it is defined as a source of personal development, a mechanism for forming metacognitive skills ("learning to learn"), a tool for diversifying thinking and systematic improvement of competencies. Digital resources offer structured self-education methodologies, especially adapted for distance learning students taking into account the practice of learning and working in remote access conditions.

A telling example is the methodological approach proposed by The Creately Blog (creately.com), which claims that thanks to modern digital resources, self-learning is no longer as difficult an activity as it was several decades ago [1]. The platform offers a structured algorithm of self-educational activity that includes the following stages:

The first stage is defining learning goals, which involves clear articulation of desired educational results and their alignment with professional or personal needs. For future physicians, this may be mastering new diagnostic techniques, for pharmacists – studying new groups of medicines, for master's nurses – mastering modern patient care protocols.

The second stage is selecting reliable learning resources. It is recommended to give preference to academic databases (PubMed, Cochrane Library, Google Scholar, JSTOR), verified online learning platforms of medical and pharmaceutical orientation (Coursera, Udemy, Medscape), professional discussion forums led by recognized

scientists or experts in a specific field of interest.

The third stage is creating a detailed action plan with clear assessments of intermediate results and deadlines, which ensures structuredness and systematicity of the self-educational process.

The fourth stage is applying acquired knowledge through creating presentations, clinical cases, videos, concept maps or mind maps, which contributes to deeper comprehension and integration of new concepts into professional practice.

The fifth stage is knowledge sharing and collaboration with colleagues through online communities of medical and pharmaceutical workers, social media platforms, specialized discussion forums, which allows identifying additional resources, obtaining alternative perspectives on the subject of study, and finding answers to complex clinical questions.

The sixth stage is mastering various methods of self-education, including traditional reading of scientific literature, visualization of medical processes, educational films about clinical procedures, online courses in medical and pharmaceutical disciplines, specialized software for simulating clinical situations [1].

Thus, the requirements and realities of modern life have led to a significant increase in the significance of self-education in the life activities of healthcare specialists, and the practice of self-education has gained widespread distribution on a global scale. In conditions of exponential growth of medical and pharmaceutical knowledge volumes, accelerated pace of technology development, and transformation of healthcare systems, the concept of self-education is no longer questioned and is recognized as a fundamental component of the modern medical and pharmaceutical educational paradigm. Self-education has transformed into an independent subsystem, a mandatory complement to the formal system of medical and pharmaceutical education at all levels.

3.3. Multidimensional Nature of the Concept of "Self-Education"

The essence and content of the concept of "self-education" in modern scientific

literature encompass several interrelated aspects of its consideration, reflecting the multidimensionality of this phenomenon:

Firstly, self-education is considered as a process of personality transformation – a continuous process of change, development, and improvement of the individual through own efforts based on the system of knowledge and relationships formed throughout life. For medical and pharmaceutical workers, this means constant transformation from student to competent specialist capable of critical thinking and making informed clinical decisions [40; 41].

Secondly, self-education is interpreted as a way of acquiring knowledge about the world and patterns of its development based on independent, systematic, purposeful work with primary sources, scientific, educational-methodological, and other literature. In the medical and pharmaceutical sphere, this includes working with clinical studies, pharmacological reference books, clinical protocols, and recommendations of professional associations [42; 43].

Thirdly, self-education is defined as a means of professional and personal growth, a mechanism for increasing a specialist's competitiveness in the labor market. Physicians, pharmacists, and nurses who actively engage in self-education demonstrate a higher level of professional competence and better career growth opportunities [44; 45].

Fourthly, self-education is understood as a form of continuous learning – endless, permanent acquisition of new knowledge, skills, abilities, general cultural and professional competencies in accordance with changing life conditions and accelerated scientific and technological progress. The concept of Continuing Professional Development (CPD) is a mandatory requirement for medical and pharmaceutical workers in most countries of the world [46; 47].

Fifthly, self-education represents a specially organized system – a set of conditions and educational, methodological, and scientific bodies and institutions necessary for human development. In medical and pharmaceutical education, this includes educational information environments, electronic libraries, distance learning systems, simulation centers [48; 49].

Sixthly, self-education is interpreted as a path to personal education in the process of formal education and as a result of this process. Graduates of medical and pharmaceutical educational institutions must not only possess a certain volume of knowledge but also have formed self-education skills for further professional development [50].

Seventhly, self-education is considered as a system of competencies – a set of knowledge, skills, abilities, and competencies acquired in the process of independent work without passing a systematic course of study in an educational institution. The ability for self-education is a key competency defined in educational standards for training medical and pharmaceutical specialists [51].

It is important to emphasize that all mentioned views on the essence of the self-education category are not mutually exclusive; on the contrary, they complement and clarify each other, forming a holistic multidimensional understanding of this phenomenon, especially important for future physicians, pharmacists, and master's nurses.

The multidimensional nature of self-education as a phenomenon is particularly clearly manifested in the context of training healthcare specialists. For future physicians, self-education is not only a way to update professional knowledge but also a method of forming clinical thinking, ability to diagnose and make decisions under uncertainty conditions. For pharmacists, self-education becomes a tool for constant monitoring of the pharmaceutical market, studying new drugs and their interactions, understanding changes in the legislative framework. For master's nurses, self-education encompasses both practical aspects of patient care and managerial competencies necessary for managing nursing teams and organizing department work.

3.4 Main Approaches to Self-Education Research in International Scientific Literature

Self-education as a phenomenon is not just a subject of scientific attention – it has evolved into an independent pedagogical concept and educational technology. In

international scientific literature of the second half of the 20th – early 21st century, several fundamental approaches to researching self-education problems are clearly distinguished:

The first approach considers self-education in the context of lifelong education theory and the lifelong learning concept. Leading representatives of this direction are Malcolm Knowles, who developed andragogy theory and the self-directed learning concept; Allen Tough, who studied independent learning projects of adults; Peter Jarvis, who studied philosophical and sociological aspects of continuing education; Paolo Freire with his concept of emancipatory pedagogy. These researchers substantiated self-education as an integral component of lifelong learning and a mechanism of personal transformation [2; 3; 4; 52].

The lifelong learning concept is particularly relevant for medical and pharmaceutical workers, as their professional activity is characterized by constant changes and knowledge renewal. In many countries around the world, requirements for mandatory continuing professional development are established for medical and pharmaceutical workers, which involves systematic participation in training events, conferences, seminars, online courses throughout the entire professional career.

The second approach focuses on theories of self-directed learning and learner autonomy development. Researchers of this direction are Stephen Brookfield, who analyzed critical thinking in the context of self-education; Philip Candy, who developed a conceptual model of self-learning; Ralph Brockett and Roger Hiemstra, who created the Personal Responsibility Orientation model in learning. This direction studies self-education as a mechanism of professional development and specialist qualification improvement, which is especially relevant for medical and pharmaceutical workers [5; 10; 53].

Self-directed learning assumes that the learner takes responsibility for determining own learning needs, formulating goals, selecting learning strategies, and evaluating achieved results. For future medical and pharmaceutical specialists, developing self-directed learning skills is critically important, as after completing basic education they must independently maintain their professional competence through

continuous learning.

The third approach is represented by transformative learning research. Jack Mezirow developed transformative learning theory, where self-education is considered as a process of critical reflection and rethinking own beliefs. Patricia Cranton continued this direction, studying the role of authenticity in the educational process. Laurent Daloz studied mentoring relationships and their role in personality transformation through self-education. Particularly important is the application of this theory in medical and pharmaceutical education, where transformation of student professional identity into practicing specialist identity is critically important [11; 12; 18; 54].

Transformative learning involves deep changes in the system of beliefs, values, and ways of understanding the world. For future medical and pharmaceutical workers, such transformations occur during clinical practice, when theoretical knowledge collides with the reality of clinical work, when students first face ethical dilemmas, when their professional identity is formed.

The fourth approach develops in the context of constructivist pedagogy and experiential learning theory. David Kolb created a learning cycle model that became the foundation for understanding self-education processes. Donald Schön developed the reflective practice concept, which is widely applied in medical and pharmaceutical education. Carl Rogers substantiated person-centered learning, where self-education is considered as a natural need of personality for self-actualization [20; 21; 22; 23; 55].

Experiential learning is based on the principle that the most effective learning occurs through direct experience. In medical and pharmaceutical education, this is implemented through clinical rotations, pharmacy practice, work in simulation centers, analysis of clinical cases. Reflection on this experience allows students to realize own actions, analyze their results, and formulate new approaches to professional activity.

Each of the mentioned approaches makes a unique contribution to understanding the self-education phenomenon and is important for organizing the educational process in medical and pharmaceutical higher education institutions. Comprehensive use of these approaches allows creating an effective system for training future healthcare specialists capable of continuous independent professional development.

3.5 Disciplinary Perspectives on Self-Education Research

Analysis of scientific studies shows significant diversity in interpretations of the concept of "self-education". This is explained by the fact that each scientific discipline considers this category according to its specific scientific content and methodological approaches.

Philosophical perspective. In the Western philosophical tradition, a view of self-education as a process of cognition and self-realization of personality has been established. Paulo Freire considered self-education as a tool of emancipation and critical awareness of reality, which remains relevant in the 21st century [33]. The philosophical approach emphasizes the existential dimension of self-education as a path to authenticity and self-fulfillment of personality. For medical and pharmaceutical specialists, this means forming own professional identity and ethical beliefs through reflection and critical thinking [56].

In the philosophical context, self-education is considered as a way of personality formation, self-determination, and self-actualization. For future physicians, pharmacists, and master's nurses, philosophical comprehension of self-education is connected with searching for the meaning of professional activity, forming own value system, understanding ethical principles of medicine and pharmacy, realizing responsibility to patients and society.

Sociological perspective. In sociological research, self-education is considered as an important component of social capital and a mechanism of social mobility. Sociologists interpret self-education as a manifestation of social culture and a mechanism of adaptation to transformations of modern society. In the context of medical and pharmaceutical education, self-education promotes professional socialization and integration into the professional community [57].

The sociological approach to self-education focuses attention on the social context of learning, the role of professional communities, the significance of social networks, and interaction between participants in the educational process. For medical and pharmaceutical workers, participation in professional associations, conferences,

communities of practice is an important component of self-education, as it allows exchanging experience, receiving support from colleagues, staying informed about the latest achievements in the field.

Psychological perspective. Psychologists study self-education as part of the continuous process of personality development. Albert Bandura in his social learning theory emphasized the role of self-efficacy in learning activity [26]. Carol Dweck studied the significance of "growth mindset" for successful self-education [27]. Barry Zimmerman and colleagues developed a self-regulated learning model that describes psychological mechanisms of self-educational activity [28; 29]. Modern research shows that self-education is based on internal motivation, metacognitive skills, and ability for self-regulation, which is critically important for future physicians, pharmacists, and nurses [58; 59].

The psychological perspective on self-education research focuses on internal processes that ensure successful learning: motivation, self-regulation, metacognition, emotional states. For future medical and pharmaceutical specialists, important are development of internal learning motivation, formation of confidence in own abilities (self-efficacy), development of skills for managing own learning, ability to overcome difficulties and maintain persistence in achieving learning goals.

Pedagogical perspective. Educators consider self-education as purposeful, systematic independent educational activity. Sharan Merriam and Lisa Baumgartner in the newest edition of their fundamental work define self-education as a form of learning in which learners take main responsibility for planning, executing, and evaluating their own learning experience [30]. Robert Kegan developed the constructive-developmental pedagogy theory, where self-education is considered as a mechanism of qualitative transformation of thinking ways [32]. Pedagogical science studies technological aspects of establishing the self-educational process, effective strategies and methods of organizing independent learning in medical and pharmaceutical educational institutions [31; 60].

The pedagogical approach to self-education concentrates on issues of organizing the educational process, creating conditions for effective independent student work,

developing methodological support, using technologies and tools to support self-education. In medical and pharmaceutical education, this includes creating educational information environments, developing tasks for independent work, organizing work in simulation centers, implementing e-learning systems.

Integration of different disciplinary perspectives allows forming a holistic multidimensional understanding of the self-education phenomenon, which is necessary for developing effective approaches to organizing self-educational activity of future physicians, pharmacists, and master's nurses in medical and pharmaceutical higher education institutions.

3.6 Key Concepts of Self-Education

Analysis of international scientific literature allows identifying several key concepts that form the modern understanding of self-education and are particularly significant for training medical and pharmaceutical specialists:

The concept of Self-Directed Learning. Malcolm Knowles defines self-directed learning as a process in which individuals take initiative (with or without help from others) in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning results [2; 3].

Modern research confirms that students of medical and pharmaceutical specialties who show initiative in learning (proactive learners) acquire more knowledge and learn more effectively than those who passively wait for instruction (reactive learners) [4; 5]. Such students demonstrate higher motivation, better retain and apply acquired knowledge in clinical and pharmaceutical practice. Modern researchers pay special attention to the relationship of self-directed learning with technological readiness and student motivation in a blended learning environment, which is especially relevant for medical and pharmaceutical education [6; 7; 8; 31].

Self-directed learning assumes a high level of autonomy and student responsibility for own learning. For future medical and pharmaceutical specialists, this

means the ability to independently identify gaps in own knowledge, formulate questions for research, find appropriate learning resources, critically evaluate information, and integrate new knowledge into own professional practice.

Andragogy theory. Knowles also developed the fundamental theory of adult learning – andragogy, which is based on six principles: learner's need to know, learner's self-concept, learner's prior experience, readiness to learn, learning orientation, and motivation [2; 3]. These principles emphasize the central role of self-education in adult learning and the need to consider the specifics of the adult learner when organizing the educational process in medical and pharmaceutical educational institutions. Modern analysis confirms that self-directed learning remains a key concept of adult education and training of medical and pharmaceutical specialists [4; 41].

Andragogy principles are important for organizing the educational process in higher medical and pharmaceutical education. Adult learners, who are students of medical and pharmaceutical specialties, need to understand why they are learning something, want to apply their previous experience in learning, strive to solve real professional problems, are oriented toward practical application of knowledge.

The concept of transformative learning. Jack Mezirow in his transformative learning theory claims that self-education can lead to deep changes in the system of beliefs and worldview of personality [11]. The process includes critical reflection on own assumptions, a disorienting dilemma that causes rethinking, and formation of new, more inclusive and integrated perspectives of understanding.

Modern research demonstrates that after 45 years of development, transformative learning theory remains "a mature but broadly and loosely defined field of research and practice" [12]. New developments include application of the theory in the context of interdisciplinary problem-based learning [15], education for sustainable development [16], and training of medical and pharmaceutical specialists [18; 54]. Transformative learning is especially important for future physicians, pharmacists, and nurses, as their professional activity requires not only technical knowledge but also developed empathy, ethical sensitivity, and ability for reflection on own practice.

Transformative changes in future medical and pharmaceutical workers often

occur during clinical practice, when they first encounter real patients, complex ethical dilemmas, limitations of medical possibilities. These experiences can cause rethinking of own beliefs, formation of new understanding of the essence of professional activity, development of professional identity.

Self-regulated learning model. Barry Zimmerman and Dale Schunk developed a self-regulated learning model that describes how learners become masters of their own learning process [28; 29]. The model includes three phases: forethought, performance/volitional control, and self-reflection. This model emphasizes the importance of metacognitive skills in self-education. Modern research confirms the effectiveness of applying self-regulated learning strategies in medical and pharmaceutical education, where students must independently manage large volumes of information and integrate theoretical knowledge with practical skills [29; 59].

Self-regulated learning assumes that the student actively controls own learning process: sets goals, plans strategies for their achievement, monitors own progress, evaluates results, and makes corrections in learning strategies. For future medical and pharmaceutical specialists, these skills are critically important, as professional activity requires constant self-control, evaluation of own actions, and their correction according to circumstances.

Experiential Learning. David Kolb created an experiential learning cycle model that includes four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation [20]. This model demonstrates how self-education is based on reflection on own experience and its transformation into new knowledge.

Modern research confirms the importance of understanding all four stages of the cycle for effective learning [21] and successfully apply this model in medical and pharmaceutical education, combining real clinical experience, discussion of clinical cases, and simulations [22; 55]. For future physicians, pharmacists, and nurses, experiential learning is critically important, as it allows integrating theoretical knowledge with practical skills in a safe educational environment.

Kolb's experiential learning cycle is widely used in medical and pharmaceutical

education for organizing clinical practice, work in simulation centers, analysis of clinical cases. Students first receive concrete experience (for example, observe the work of a physician or pharmacist, perform a certain procedure in a simulation center), then reflect on this experience (analyze what happened, what were their actions and reactions), form abstract concepts (generalize experience, formulate principles), and actively experiment (apply new knowledge in other situations).

The concept of Reflective Practice. Donald Schön in the "reflective practitioner" concept emphasizes the importance of constant self-education for professionals [23]. Reflective practice involves critical analysis of own actions, decisions, and their consequences, which allows practitioners to learn from own experience and constantly improve their professional activity. The concept of communities of practice demonstrates how self-education is realized in the collective context of professional learning [24; 25; 37].

In medical and pharmaceutical education, reflective practice is recognized as a key component of professional development, as it allows future specialists to analyze complex clinical situations, own decisions and their consequences, which promotes deeper understanding of professional activity and development of clinical thinking [55; 60].

Reflective practice includes two types of reflection: reflection-in-action, which occurs directly during professional activity performance, and reflection-on-action, which occurs after activity completion. Both types of reflection are important for professional development of medical and pharmaceutical workers, as they allow learning from own experience and constantly improving professional practice.

The concept of non-formal and informal education. Modern researchers emphasize that a significant part of adult learning, including medical and pharmaceutical workers, occurs outside formal educational structures [34; 52]. They distinguish non-formal education (structured but outside formal institutions) and informal education (incidental learning from daily experience), both types of which are based on individual self-educational activity. For physicians, pharmacists, and nurses, non-formal and informal education includes participation in conferences, seminars,

clinical rounds, consultations with colleagues, which constitutes a significant part of their professional development.

Non-formal education for medical and pharmaceutical workers may include participation in professional conferences, workshops, master classes, online courses, webinars. Informal education occurs spontaneously in the process of professional activity – through consultations with colleagues, discussion of clinical cases, reading professional literature, viewing medical and pharmaceutical resources on the Internet.

3.7 Contemporary Trends in Studying the Self-Education Phenomenon

Analysis of modern international research allows identifying several leading trends in studying the self-education phenomenon that are particularly significant for medical and pharmaceutical education:

The first trend is increasing attention to the role of digital technologies in self-education. Researchers develop theories that describe learning in the digital age as a process of forming knowledge networks [35; 36]. Massive Open Online Courses (MOOCs) and other digital platforms create new opportunities for self-education of medical and pharmaceutical workers on a global scale, providing access to courses from leading universities of the world, clinical databases, virtual simulations, and interactive learning resources. Special attention is paid to integration of artificial intelligence in supporting self-directed learning, including personalized learning systems, intelligent tutors, and adaptive learning platforms [9; 34; 48].

Digital technologies radically change the landscape of self-education in medical and pharmaceutical fields. Online platforms such as Coursera, edX, FutureLearn offer specialized courses in medicine and pharmacy from leading universities of the world. Professional medical and pharmaceutical databases (PubMed, Cochrane Library, UpToDate) provide access to current scientific publications. Mobile applications allow quickly finding information about medicines, interactions, dosages. Virtual and augmented reality create new opportunities for simulation training.

The second trend is growing interest in self-education in the context of

professional development of medical and pharmaceutical specialists. The concept of Continuing Professional Development (CPD) requires physicians, pharmacists, and nurses to engage in systematic self-education to maintain and enhance professional competence. Reflective practice and participation in communities of practice become mandatory elements of professional life of medical and pharmaceutical workers [23; 24; 25; 37; 46; 47].

In many countries of the world, systems of mandatory continuing professional development exist for medical and pharmaceutical workers, which involve accumulating a certain number of credits or points through participation in training events. These systems stimulate self-educational activity, as they link it with the possibility of continuing professional practice and raising qualification category.

The third trend is development of neuroscientific understanding of self-education processes. Research on brain neuroplasticity confirms that self-directed learning can lead to structural changes in the brain, especially under conditions of high motivation and emotional engagement [38]. These discoveries have important implications for developing effective learning strategies in medical and pharmaceutical education, particularly for understanding mechanisms of clinical thinking formation and practical skills development.

Neuroscientific research shows that the brain remains plastic throughout life, that is, capable of changes in response to new experience and learning. For medical and pharmaceutical workers, this means that lifelong learning is not only possible but also necessary for maintaining cognitive functions and professional competence. Understanding neuroscientific mechanisms of learning helps develop more effective self-education strategies.

The fourth trend is actualization of the problem of developing self-education skills in the context of the lifelong learning concept. The European Union in its updated documents defines "learning to learn" as one of the key competencies for life in modern society [39]. For medical and pharmaceutical specialists, this competency is critically important due to rapid knowledge renewal in the field, emergence of new diagnostic and treatment methods, new medicines and medical technologies [40; 41; 51].

Lifelong learning becomes the norm for all citizens of modern society, but for medical and pharmaceutical workers it is a professional necessity. Rapid changes in medical and pharmaceutical knowledge, technologies, treatment protocols require constant renewal of professional competencies. The ability for effective self-education becomes a key competency that determines the success of professional career.

The fifth trend is growing attention to interdisciplinary aspects of self-education in medical and pharmaceutical education. Modern healthcare practice requires specialists to be able to work in interdisciplinary teams, integrate knowledge from different fields, understand social determinants of health. This requires developing the ability for self-education not only within own specialty but also in related fields of knowledge [56; 57].

The interdisciplinary nature of modern medicine and pharmacy means that specialists must understand not only their narrow specialization but also have knowledge from related fields. Physicians must understand pharmacology, psychology, sociology, ethics. Pharmacists need knowledge from medicine, chemistry, technology. Nurses need knowledge from medicine, psychology, management. Self-education in an interdisciplinary context becomes increasingly important for effective professional activity.

The sixth trend is development of personalized self-education support systems. Modern technologies allow creating adaptive learning systems that take into account individual learner characteristics, their previous experience, learning style, pace of material mastery. Artificial intelligence and machine learning are used to analyze data on student learning activity and provide personalized recommendations on learning trajectories [9; 48].

Personalization of self-education means that each student or practicing specialist can choose own learning trajectory according to their needs, interests, level of preparation. Adaptive learning systems automatically adjust to the learner's knowledge level, offering more complex or simpler tasks depending on previous learning results.

Conclusions

The conducted analysis of the self-education phenomenon in contemporary scientific discourse allows drawing the following conclusions:

1. Self-education is a multidimensional phenomenon that can be considered as a process of personality transformation, a way of acquiring knowledge, a means of professional and personal growth, a form of continuous learning, a specially organized system, a path to personal education, and a system of competencies. All these aspects complement each other and form a holistic understanding of self-education as an integral component of professional development of healthcare specialists.

2. In international scientific literature, four fundamental approaches to self-education research are distinguished: lifelong education theory and the lifelong learning concept; theories of self-directed learning and learner autonomy development; transformative learning research; constructivist pedagogy and experiential learning theory. Each of these approaches makes a unique contribution to understanding the self-education phenomenon and is important for organizing the educational process in medical and pharmaceutical higher education institutions.

3. Disciplinary perspectives (philosophical, sociological, psychological, pedagogical) reveal different aspects of self-education: philosophical – the existential dimension of self-education as a path to authenticity and professional identity formation; sociological – the role of professional communities and social context of learning; psychological – internal processes (motivation, self-regulation, metacognition) that ensure successful learning; pedagogical – organization of the educational process and creation of conditions for effective independent student work.

4. Key concepts of self-education include: self-directed learning, which assumes a high level of student autonomy and responsibility; andragogy theory with its principles of adult learning; transformative learning concept leading to deep changes in the belief system; self-regulated learning model with emphasis on metacognitive skills; experiential learning through Kolb's cycle; reflective practice as the basis of professional development; concept of non-formal and informal education.

5. Contemporary trends in studying the self-education phenomenon include: increasing role of digital technologies and artificial intelligence in supporting self-education; integration of self-education into continuing professional development systems; development of neuroscientific understanding of learning processes; actualization of lifelong learning as a key competency; attention to interdisciplinary aspects of self-education; development of personalized self-education support systems.

6. For medical and pharmaceutical education, self-education acquires special significance due to the specifics of professional activity of physicians, pharmacists, and master's nurses, which is characterized by:

– rapid renewal of professional knowledge and technologies;

– high level of responsibility for patients' life and health;

– need to make decisions under uncertainty conditions;

– need for continuous professional development;

– importance of integrating theoretical knowledge with practical skills;

– necessity of developing critical thinking and reflective practice;

– work in interdisciplinary teams.

7. Effective organization of self-educational activity of future physicians, pharmacists, and master's nurses requires a comprehensive approach that includes:

– forming motivation for self-education and understanding its importance for professional success;

– developing self-directed learning and self-regulation skills;

– creating a favorable educational information environment with access to modern educational resources;

– integrating digital technologies and self-education support tools;

– forming communities of practice and opportunities for collaborative learning;

– developing reflective skills and critical thinking;

– ensuring connection between theory and practice through experiential learning.

8. The theoretical foundations of self-education considered in this chapter create a foundation for further research on the specifics of organizing self-educational activity

of future specialists in medical and pharmaceutical fields in conditions of modern educational information environments of medical higher education institutions. Understanding the self-education phenomenon, knowledge of key concepts and contemporary trends allows developing effective pedagogical conditions and strategies for organizing self-educational activity.

9. Integration of different approaches and concepts of self-education into the practice of medical and pharmaceutical education allows creating a holistic system for training future healthcare specialists capable of continuous independent professional development throughout their entire career. This corresponds to modern requirements for medical and pharmaceutical workers and ensures high quality of providing medical and pharmaceutical care to the population.

10. Further research on organizing self-educational activity of future physicians, pharmacists, and master's nurses should be based on the presented theoretical foundations and take into account the specifics of each specialty, features of the educational information environment of medical higher education institutions, possibilities of modern digital technologies, and best international practices of organizing medical and pharmaceutical education.

Thus, the theoretical foundations of self-educational activity of future specialists in medical and pharmaceutical fields considered in this chapter form a solid foundation for developing effective pedagogical conditions and practical recommendations for organizing self-educational activity in medical higher education institutions, which will be discussed in subsequent chapters of the monograph.