

Upgrading Master's Training for Higher Education Instructors in the Digital Era: Public Health Education as an Example

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KEYWORDS

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ABSTRACT

This study elucidates the theoretical underpinnings and underscores the imperative of enhancing master's training programs for higher education teachers within the educational digitalization landscape on the public health education example. The research elucidates that at the core of this evolution lies the technological concept, necessitating the development of a meticulously grounded model for the purposeful and well-organized training of higher education faculty within a digitally transformed educational framework. This model delineates a meticulously outlined structure, content framework, a judicious selection of methodologies and techniques, and a methodical integration of technological advancements to ensure the realization of desired educational outcomes. The structural-functional model encompasses integral components such as the methodological-objective facet (incorporating societal demands, educational objectives, conceptual approaches to professional development, and digitalization elements), the constructive-procedural dimension (comprising educational directions, organizational forms in the digital paradigm), the profession-specific aspect (encompassing content, technologies, methods, pedagogical tools), and the analytical-effective domain (defining criteria, process metrics, diagnostic tools), in conjunction with organizational-pedagogical parameters. Emphasis is placed on nurturing a tailored educational milieu and fostering educational innovations to augment the efficacy of training enhancements with a specific lens toward public health implications. The article substantiates the criteria and metrics for bolstering master's training initiatives for higher education instructors, underlining the distinct facets of national educational digitalization and the unique dynamics among higher education stakeholders. The contemporary relevance of revamping master's programs for teachers is underscored through exploring diverse digital learning formats employing information technologies, digital resources, and cloud-based tools. Initiatives aimed at reshaping the master's educational landscape to align with the digital era will entail validating the proposed model's efficacy through experimental validation across domestic and international educational realms.

1. Introduction

The realities of the third millennium, encompassing globalization, intensified information flows, European integration, and collaborative efforts between higher education institutions and market-oriented employees, present the higher education system with a series of imperative tasks. Foremost among these tasks is the need for sustainable, cohesive, and innovative development aimed at nurturing the intellectual, moral, and social capital of a society prepared for the challenges that the future holds. In this context, it is paramount to elevate the training of master's candidates to prepare the new generation of higher education educators effectively. These educators are pivotal in delivering high-quality educational services and cultivating competitive specialists in education and related fields. They promote elevated levels of competence, intellectual capacity, social responsibility, and the ability to nurture personal potential, professionalism, and upward mobility in a digitally-driven society. The indispensable digitalization of the education system is essential to achieve these objectives. This transformative process paves the way for an innovative educational environment, the development of software products for computer-based educational systems, and the introduction of a new generation of textbooks, tools, and methods that personalize the learning process. Furthermore, it emphasizes the

practical application of competencies and the integration of information and communication technologies to shape a holistic educational and scientific environment. This digitalization creates abundant opportunities for informal education, improves access to training materials for individuals with special needs, and enables flexible learning at various times and locations.

Regarding upgrading master's training for higher education instructors in the digital era, public health arena emerges as a critical and timely example of integrating innovative educational practices with contemporary digital advancements. As Ćwiklicki et al. (2021) note, public health education serves as a prime sector where the amalgamation of technological innovations and educational strategies can have a profound impact on addressing societal challenges.

Strategic initiatives towards digitalizing the educational environment have been outlined in the Strategy for Higher Education Development in Ukraine for 2022–2032 and its Operational Plan for implementation during 2022–2024 (Moshnyaga, 2023). This national agenda aligns with the directives set out in various government programs and decisions that actively drive transformative changes, particularly in the education sector towards digitalization. Noteworthy initiatives include the involvement in international innovative programs such as the "Digital Pedagogic Transformation" collaborated with renowned educational institutions like Harvard University, the application of tools from the "Google Digital Tools for Education" program, utilization of Microsoft digital instruments, and the adoption of the draft Concept for Digital Transformation of Science and Education till 2026. These strategies aim to leverage digital technologies to streamline data management, enhance collaboration, and facilitate educational advancements locally and internationally. Incorporating considerations from representatives in public health sector within the digitalization efforts in the education sector involves promoting digital literacy, improving access to educational resources, and enhancing the overall well-being of students and educators through technology-driven educational enhancements. This holistic approach ensures that the digital transformation in education not only fosters academic excellence but also contributes to the broader success of the educational community.

Theoretical Framework

The digitalization of the education system becomes indispensable in fostering an innovative educational environment. It involves the development of software products for computer-based educational systems, the creation of a new generation of textbooks, tools, and learning materials to individualize the education process. The focus shifts towards the practical application of competencies, leveraging information and communication technologies to create a comprehensive educational and scientific environment. Digitalization enhances informal education opportunities, increases accessibility to learning materials for individuals with special needs, allows for flexible learning schedules, and provides a conducive learning environment accessible from any location.

Within the context of this study, significant research is conducted to justify the scientific and educational paradigms and socio-pedagogic characteristics of master's training for higher education teachers. This includes exploring the professional direction, goal setting, and content development. The examination delves into competency-building and explores the application of modern educational technologies. When forming the theoretical foundations for this study, several key researchers have made substantial contributions in various areas. Panasevych (2013) addresses the implementation of the Law of Ukraine "On Higher Education," while Tsiuniak (2020) emphasizes the essential need for comprehensive education in contemporary society. Yeremenko (2012) discusses theoretical, legal, and organizational approaches to fostering the European dimension of higher education quality through internationalization. Kotukha et al. (2022) focuses on adapting student-oriented education to digital environments, and Khalina & Syrovatsky (2020) examine a holistic approach to developing and accessing education programs, particularly focusing on the outcomes of training higher education applicants. Mitrović et al. (2022) and Onyshchuk (2018) highlight the increasing emphasis on practical education for ensuring educational quality.

Additionally, research on issues such as peculiarities in organizing master's training, quality control,

and methodological foundations is discussed in works by Bereka (2011), Yeremenko (2012), Kukh et al. (2018), and Liulka (2013).

The essence of education digitalization is explored in studies by Bendak et al. (2020), Opar & Nishko (2023), Spirin et al. (2023), Cherep et al. (2023), Diachenko et al. (2024), and others. Kukushkin & Kolesnikova (2022) anticipates digitalization as a predominant trend that will significantly impact higher education in the next two decades. Stratan-Artyshkova et al. (2022) highlights the direct connection between digitalization and enhancing Ukraine's education system to meet European standards. Potapchuk et al. (2024) underscores the benefits of digitalization in enhancing administrative processes, facilitating information exchange, and maintaining educational continuity even during emergencies.

Digitalization is a popular segment for discussion and implementation, particularly into the education environment (Voronkova et al., 2023). Considering the conditions that determine the current situation in the education, socio-economic (Yankovyi et al., 2020) and the cultural sectors, digitalization has become a perspective instrument for renovation and development of interaction between the subjects of the training process at a higher education institution. Digitalized education changes the physical and the mental landscape of a personality and modes of work in a digitalized society, which is determined by the symbiosis and diffusion of mobile instruments, the social networking functionality, and the big databases technology. Continuity and broadening of possibilities, launch of the outsourcing mechanisms, rapid data analysis and interpretation for decision-making, interactivity of a person's digital dimension, the launch of digital commerce and metamorphoses with the intellectual infrastructure etc. determine a qualitatively new operation of the education process and outline the direction for building up students' personal education trajectories. As a dominant cultural force, digitalization changes the content, the functional direction, and influences the modernization of the education process model, including those of the future educators, distinguishing in the prerogative the trilateral content in the form of the intense feedback between the teacher, the technologies, and the subject of learning. Aspirations concerning implementation of the world tendencies have led Ukraine in 2021 to the 54-th position in the World Competitiveness Rankings in digitalization, in particular in readiness for digital transformations, investments in education, research and development and design works, in the digital technologies' potential and the IT area capitalization.

A substantial facet of digitalization of an all-state scale has become the launch of a separate "Diia" digital education portal with three separately distinguished Frames for digital competences: for businesspersons, state service workers, and for educators, which sets up a trajectory for developing the standards in education and designing education programs by education services providers, etc. The Frame encompasses 5 areas of digital competences that contain 22 competences and 5 levels of mastering them, which affects the specialists' professional activity level, the extent of their mastery in modern digital technologies and expertise in the use of educational online-platforms (Ministry of Digital Transformation of Ukraine, 2022).

Digitalization is the process that forms competences with the application of digital education technologies (as an instrument) and which is designed to ensure an adapted mobile level of teaching the digital systems to students and to acquire experience of implementing them in professional area as a result. It stimulates transition of the information field, the education sector included, to the digitalized form with the involvement of digital services and products, instruments and platforms. This determines re-thinking of the roles of the education process participants, qualitative changes in higher education institutions' activities and in the labor market.

Unique opportunities provided by digitalization for introducing new forms of interaction between teachers, students, and stakeholders that stimulate a fruitful search for valuable propositions by education service providers are highlighted by Brunetti et al. (2020). Haleem et al. (2022) attributes various advantages of digitalization to teachers, such as practical control over the efficiency of the education process, the quality of learning material acquisition, time management, and the level of comprehension of new information.

Regarding innovations in the education process (technologies, methodologies, forms, and tools), studies by Makri et al. (2021) and Scull et al. (2020) emphasize the changing role of the teacher. Kasyanova (2020) advocates for the development of an author's theoretical model or system to study the phenomenon through modeling methods.

Digitalization in public health education has led to the development of innovative teaching tools and platforms that enhance learning experiences (Maltzahn & Mosch, 2020). Virtual simulation tools, such as immersive scenarios and case studies, allow students to engage with real-world health challenges in a controlled environment, improving critical thinking and decision-making skills (Vázquez-Calatayud et al., 2024). Online learning platforms offer flexibility and accessibility, enabling students to access educational materials anytime, anywhere. The utilization of data analytics and artificial intelligence has revolutionized public health education by enabling educators to analyze health trends, predict outbreaks, and personalize learning experiences (Wang et al., 2023; Hutsaliuk et al., 2023). Big data analytics provide insights into population health patterns, guiding curriculum development and intervention strategies (Pramanik et al., 2020). AI-driven technologies facilitate adaptive learning, personalized feedback, and automated assessment processes, enhancing student engagement and comprehension.

Digitalization has enabled the integration of telehealth and telemedicine applications in public health education (Iyamu et al., 2021). Through telehealth platforms, students can participate in virtual consultations, observe clinical practices remotely, and engage in interprofessional collaboration. Telemedicine technologies bridge the gap between theory and practice, offering hands-on experience in diagnosing, treating, and managing health conditions in a virtual setting (Anthony Jnr., 2023).

Digital platforms facilitate global collaboration and knowledge sharing among public health educators and professionals (Stellefson et al., 2020; Chan et al., 2020). Online forums, webinars, and virtual conferences provide opportunities for networking, sharing best practices, and staying updated on the latest research and developments in public health (Thapliyal et al., 2024). Collaborative research projects and international partnerships foster innovation and cross-cultural learning experiences. Despite the numerous benefits of digitalization in public health education, challenges exist, including issues related to digital literacy, technology accessibility, data privacy, and security concerns. Ensuring equitable access to digital resources and fostering digital competencies among educators and students are essential for maximizing the potential of digital technologies in public health education.

Therefore, an analysis of research on the subject suggests the urgency of transitioning to a qualitatively new level in master's training for higher education teachers, underpinned by information technologies. Key factors that facilitate this transition include:

- Establishing a modern and prestigious higher education system that responds effectively to current challenges.
- Cultivating high-quality human capital equipped to thrive in an information-driven and technological society.
- Transferring innovative outputs to social and economic sectors to support sustainable development.
- Designing education programs that consider the feedback and interests of all stakeholders involved in the implementation process.
- Recognizing the need for new pedagogical roles such as tutors, advisors, coaches, facilitators, and mentors, adapted from global best practices.
- Addressing the challenges posed to the education sector by the COVID-19 pandemic, full-scale aggression of Russia, forced population migration, and the ensuing psycho-emotional instability and tension among both educators and students.

- The goal of the study is a theoretical substantiation of ways to upgrade the master's training for higher education teachers under education sector's digitalization through introduction of modifications to its structural- and operational model with singling out the principal criteria for monitoring its efficiency.

Additionally, the article empirically assesses the value of digitalizing education as part of enhancing master's training.

2. Methodology

Upgrading of the master's training for higher education teachers under education digitalization is based on the three mutually linked concepts that ensure substantiation, development, and practical implementation of the model of the studied process: the methodological concept as mutual relation and interaction between the general science and specific methodological approaches to the study of the process of educating specialists in the field of higher learning at a higher education institution under innovative conditions; a theoretical concept as a defining of a unified frame of the studied phenomenon by corresponding concepts; a technological concept as designing a scientifically substantiated model of a purposeful, rationally organized master's training for higher education teachers in a digitalized education which supposes a clearly defined structure, content, a carefully selected set of techniques and methods, sequential implementation of technological stages, and ensures an estimated outcome.

The methodological concept supposes the use of general science approaches when developing the model of the studied phenomenon – the systematic, the synergetic, the functional, and the axiological approaches. The systematic approach as a basic for theoretical foundation of the present-day psychology- and pedagogical sciences is applied for constructing a model of master's training for a higher education teacher in the context of education digitalization on the grounds of the related methodological principles and scientific cognizance methods, owing to which the integrated properties of the structure and content of the studied object are manifested with simultaneous use of the substantiated forms, methods, and technologies of education and its support through forming relevant conditions and implementation by the specified directions.

The synergetic approach enables outlining a new paradigm in a present-day higher education which, by modernizing the traditional model of solving educational problems, renovates conceptually the training system through the new content of education, education technologies, their implementation into institutional practice, forming conditions for shaping students' individual education trajectories.

The functional approach directs at singling out the peculiarities in operation of the master's training system for specialists in terms of relations with the environment considering its stability, objects' retention, and significant changes. This approach enables detecting dependencies between the system's input and output parameters.

The axiological approach as a basis of the new philosophy of education is inherent to the humanistic pedagogy, for it stipulates the value of a person, their life and professional activity, equivalence between traditions and creativity, equality between people in dialogue search for value senses (Kasyanova et al., 2018). Axiological knowledge within the context of education digitalizing enhances the progress in development of both an individual and the society as a whole, conditions for permanent education and utmost creative realization of potential skills and aspirations that conditions a personality for changes and acts as a progressive basis for development of a state.

To specific scientific approaches to building-up a model of master's training for higher education teachers pertain the competence, the holistic, the frame, and the praxiological approaches.

The competence approach provisions for shift in the accent from amassing the officially determined knowledge, facilities and skills in favor of forming in a future specialist the ability of acting practically, to apply the skills and successful experience in professional activity situations and social practice. Designing a model of master's training on the premises of the competence approach supposes its being

focused on forming and development in higher education teachers of general, professional and subject-related competences, which is reflected in the content, forms, methods, and means of education.

The holistic approach is associated with a wholesome development of a personality and its possibilities in various areas of life (Vasylenko, 2010), and is characterized by mutual esteem and productive cooperation between all participants in the education process and is based on a vast, open and unlimited information field, perspective experience and the established relevant constituents of their context (Oriehova, 2018).

The frame approach has made it possible to construct individual concepts into a solidified wholesome and structural model of master's training for higher education teachers under digitalization by way of its frame-by-frame visualization. The frame model of teaching enables fulfilling a quality education process in quite brief periods owing to compaction of the material to be learned, although the quantity of units of information remains within the amount needed for training a future professional. The frame approach is primarily based on cognitive content of both a specific education system and a particular individual.

The praxiological approach got an acclaim in education due to the change in requirements to the quality of specialist training at a higher education institution in terms of their competence, efficiency, competitiveness and support by stakeholders – potential employers, relevant professional community, students and graduates. This approach provisions for a future specialist to master a conscious choice of means, techniques and methods of professional activity related to ensuring its best results, stimulates creativity, generates a rational system of inner motives and active transformational practice (Ge, 2023).

The basis for the development of this research's theoretical concept are specialists' scientific and practical achievements and the regulation- and legal field of study, namely, the Laws of Ukraine: "On Education" (2017), "On Higher Education" (2014), "On Scientific and Science- and Technical Activity" (2016), "On Innovation Activity" (2002), the decree of the Ministry of Education and Science of Ukraine "On Approving the Conceptual Foundations for Development of Pedagogic Education in Ukraine and its Integration into the European Education Environment" (2004), the Concept for the Development of Pedagogic Education (2018), the Concept for Specialists Training by the Dual Form of Education (2018), the Concept for the National and Patriotic Education in the Education System of Ukraine till 2025 (2022), The Standard for Higher Education in Specialty 011 "Educational, Pedagogical Sciences" for the Second (Master's) Degree of Higher Education (2021), and others. To understand the inclusion of education digitalization into the specialists training programs, let us turn to the following official sources: the Concept for Artificial Intelligence Development in Ukraine for 2021–2024 (2020), The Concept for Digital Competences Development (2021), draft project of the Concept for Digital Transformation of Education and Science in Ukraine till 2026 (2021), the Digital Program for Europe (2010), etc. The official documents, programs and draft projects accentuate on the need in transformational changes both in the theory of higher professional education and in its practical fulfillment; attention is also accentuated on education sector's perspectives owing to their implementations, possibilities and consequences of the prospective transformations are outlined. Digitalization becomes the key for readiness of the education sector and its participants to be competitive and demanded in the production and services market.

Research Model

Research Design:

Mixed-Methods Approach: This study adopted a mixed-methods research design to comprehensively investigate the strategies and impact of upgrading master's training for higher education instructors in the digital era within the field of public health education. The mixed-methods approach involved both quantitative data analysis and qualitative inquiry to provide a holistic understanding of the topic.

Participant Selection:

The study employed a total of 50 participants who were higher education instructors specializing in public

health education. The selected participants ranged in age from 30 to 55 years, with an average age of 40 years.

Participants were selected based on their experience and expertise in digital pedagogy and educational technology. The selection criteria included:

- a. Teaching at the master's level in pedagogical sciences.
- b. Demonstrated knowledge and proficiency in digital pedagogy.
- c. Usage of educational technology in their teaching practices.
- d. Experience with online teaching and learning platforms.

The participant selection process involved reaching out to potential candidates through online platforms such as university communication channels, professional forums, and educational networks. Interested individuals were invited to participate in the study based on their qualifications and alignment with the study criteria.

Data Collection:

Quantitative Data: Questionnaires were administered to gather quantitative data on instructors' perceptions, experiences, and training needs in digital education (Table 1). The surveys included Likert scale questions and structured response formats to quantify responses.

Table 1. Questionnaire for Higher Education Instructors in Public Health Education

Personal Information		
1	Age	[Please specify your age]
2	Gender	[Male / Female / Other]
3	Years of Teaching Experience	[Please indicate the number of years you have been teaching at the master's level in public health education]
Digital Pedagogy and Educational Technology		
4	Are you familiar with digital pedagogy and its applications in education?	[Yes/No]
5	How would you rate your proficiency in digital pedagogy on a scale of 1 to 10, with 10 being the highest?	[1...10]
6	Do you actively use educational technology in your teaching practices?	[Yes/No]
7	Please list the educational technologies you have utilized in your teaching.	[...]
Online Teaching Experience		
8	Have you conducted online teaching sessions before?	[Yes/No]
9	How comfortable are you with online teaching platforms?	[Very Comfortable / Comfortable / Neutral / Uncomfortable / Very Uncomfortable]
Training and Development Needs		
10	Do you feel the need for further training in digital pedagogy?	[Yes/No]
11	What specific areas of digital pedagogy or educational technology do you wish to enhance your knowledge in?	[...]
General		
12	What motivated you to specialize in public health education at the master's level?	[...]
13	How do you think digitalization has impacted teaching in the field of public health education?	[...]
14	How important do you consider continuous professional development in digital pedagogy for higher education instructors?	[...]

Qualitative Data: In-depth review of relevant scientific works was explored to collect qualitative data on the challenges, opportunities, and best practices associated with incorporating digital technologies in education including public health sector. The qualitative data offered insights into the nuances and

complexities of digital training in higher education.

Data Analysis:

Quantitative data was analyzed using statistical software to generate descriptive statistics and inferential tests. The thematic analysis process involved categorizing themes and interpreting the narratives to extract key insights.

Ethical Considerations:

Informed Consent: Participants were provided with informed consent forms outlining the study objectives, procedures, and confidentiality measures. Consent was obtained prior to data collection.

Anonymity and Confidentiality: Measures were implemented to ensure the anonymity of participants and confidentiality of their responses to protect their privacy.

Evaluation:

Effectiveness Assessment: The study evaluated the effectiveness of the upgraded master's training programs through pre- and post-training assessments, participant feedback, and program evaluation surveys. The impact of digital training on instructors' pedagogical practices and student learning outcomes were assessed.

3. Results and discussion

The survey aimed to gauge participants' proficiency and experiences in digital pedagogy, their use of educational technology, online teaching practices, and training needs. The majority of participants fell within the age range of 36-40 years, followed by 41-45 years and 30-35 years. Female participants outnumbered male participants, with nearly 58% being female and 42% male. The distribution of teaching experience varied, with the highest number of participants having 6-10 years of experience. This was followed by instructors with 11-15 years of experience, showing a relatively balanced spread across different experience brackets. (Table 2).

Table 2. Statistical Data

Personal Information		
Age	30-35 years	10 participants
	36-40 years	15 participants
	41-45 years	12 participants
	46-50 years	8 participants
	51-55 years	5 participants
Gender	Male	21 participants
	Female	29 participants
	Other	0 participants
Years of Teaching Experience	1-5 years	7 participants
	6-10 years	12 participants
	11-15 years	10 participants
	16-20 years	11 participants
	21+ years	10 participants
Digital Pedagogy and Educational Technology		
Familiarity with Digital Pedagogy	Yes	45 participants
	No	5 participants
Proficiency in Digital Pedagogy (Rating out of 10)	Average Rating:	7
Active Use of Educational Technology	Yes	42 participants
	No	8 participants
Educational Technologies Used	Top technologies mentioned	Learning Management Systems
		Online Collaboration Tools
		Virtual Reality Simulations

Online Teaching Experience		
Previous Online Teaching Sessions	Yes	40 participants
	No	10 participants
Comfort Level with Online Teaching Platforms	Very Comfortable	18 participants
	Comfortable	20 participants
	Neutral	7 participants
	Uncomfortable	3 participants
	Very Uncomfortable	2 participants
Training and Development Needs		
Need for Further Training in Digital Pedagogy	Yes	30 participants
	No	20 participants
Specific Areas for Enhancement	Top Areas	Adaptive Learning Technologies
		Gamification in Education
General		
Impact of Digitalization on Teaching in Public Health Education	Positive impact	42 participants
	Neutral impact	5 participants
	Negative impact	3 participants
Importance of Continuous Professional Development	Very Important	34 participants
	Important	16 participants
Motivation to Specialize in Public Health Education	Various personal motivations cited	

By exploring their attitudes and perspectives, we gain valuable information on the current landscape of digital pedagogy in the context of public health education. Thus, majority of participants (90%) were familiar with digital pedagogy and its applications in education. The average proficiency rating in digital pedagogy among participants was 7 out of 10, indicating a relatively high level of competency. 84% of participants actively used educational technology in their teaching practices, showcasing a strong integration of technology in their educational approach. A significant majority (80%) of participants had previous experience with online teaching. The distribution in comfort level varied, with a majority feeling either *very comfortable* (45%) or *comfortable* (50%) using online teaching platforms. 60% of participants expressed the need for further training in digital pedagogy (Figure 1).

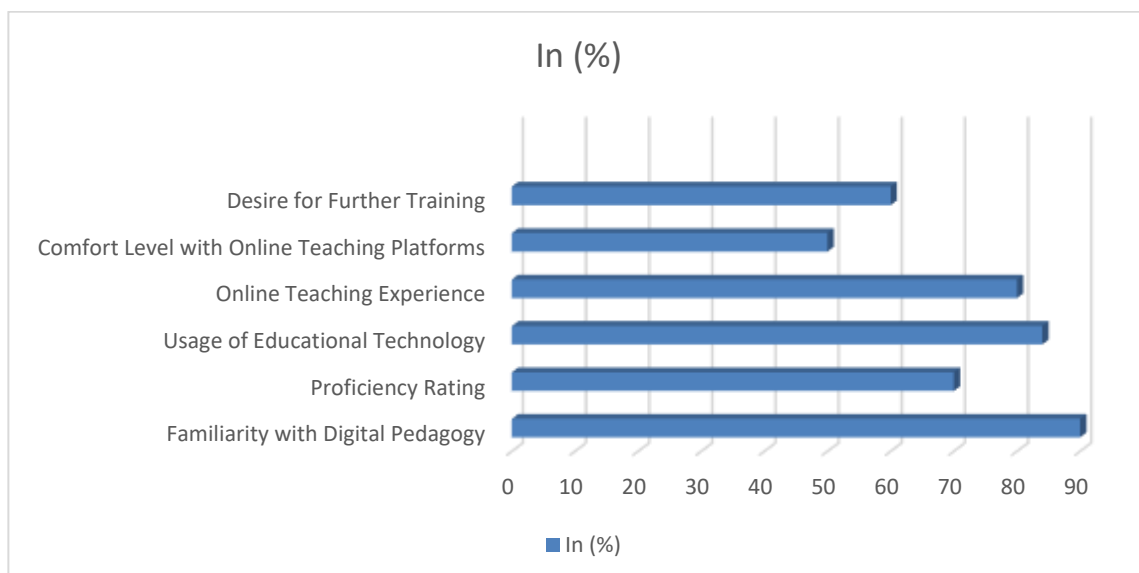


Figure 1. Digital Pedagogy Statistics Chart for Public Health Education Participants

These outcomes demonstrate how well-versed in digital pedagogy and educational technology the participants are, as well as how much they value ongoing training and growth in interactive and adaptive learning methodologies. The widespread usage of educational technologies in their teaching practices is well-aligned with the comfort level of online teaching platforms. A large proportion of the respondents (84%) agreed that digitalization had improved public health education instruction. The significance of ongoing professional growth in the field was highlighted by 80% of participants (Figure

2).

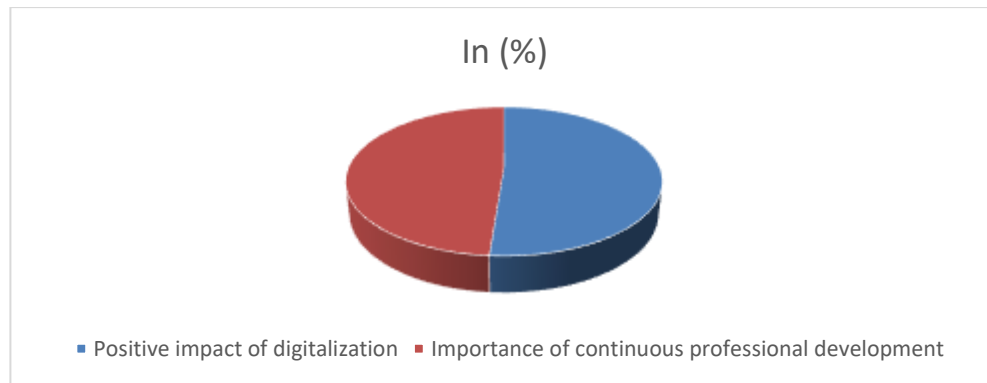


Figure 2. Digitalization Impact and Professional Development Importance in Public Health Education

Among the peculiarities of the national education system's digitalization, one can distinguish the changes introduced to it under the impact of world tendencies, the worldwide pandemic, and the martial law in Ukraine. Attention should be drawn to:

- a. The transition to the education environment models with students' active cognitive activity based on individual mastering the knowledge, skills, and aptitudes.
- b. The transition of teaching to the digitalized education resource area with the contact through an educational platform selected by the higher education institution to form a personalized education environment.
- c. The use of cloud services, platforms, virtual repositories, libraries, social networks, scientific and educational search engines, and specialized software (Zotero, Mendeley, etc.) for placing an education component with open access with individualization and restructuring of learning material and a search for new forms of presenting it.
- d. Designing establishing laboratories, test- and experimental locations that account for the rate of introducing innovations within the digitalized environment and are oriented at flexibility and mobility during the distance education process.
- e. Intensive use of digital mobile and information- and communication technologies, creative digital data, GPS technologies, etc., which improves communication contacts and satiates the education environment with interactive feedback, ensures accessibility of training information, permanent improvement in digitalized skills, enables design work through weaving the BIG DATA technologies into the fabric of education and learning for joint development of ideas and decisions, motivation for implementing programs, models, projects in the information environment and support of start-ups, visual communication with students with admitting "the supra-priority effect of a picture", immediate assessment and comments on their learning- and cognitive activity, the transformation of education environment in terms of inclusivity.
- f. Analyticity and prognostication for management, including risks in professional activity (determining risk areas, factors, outcomes, and ways to overcome them (for instance, refusal from using unknown or insufficiently tested information technologies), through an increase in the number of approbated modern information technologies, etc.).
- g. Organization of information digitalizing through the digital skills complex, which is approved by education programs for teachers and specialists' training.

Therefore, perspective strategies of education segment development as part of the socio-cultural civilizational progress determine education environment modernization and upgrading of specialist training programs at higher education institutions. A problem-oriented analysis of the studies and

experience in the outlined problem enables the development of an author's structural-functional model of master's training for higher education teachers under conditions of education digitalization, which is provisioned for by the technological concept for upgrading the mentioned process. The structural-functional model of master's training for higher education teachers under education digitalization is a nominal system wherein, according to the study's goals, the most constitutive characteristics of the studied object are visualized along with its properties and links to study and aggregate information on it. The presented model consists of a sum total of structural, mutually related, and interdependent components that form a wholesome inner structure, and which is oriented at the fulfillment of tasks in specialist training. In the course of this research and analytical work on the data, it was clarified that the structural-functional model of master's training for higher education teachers under education digitalization contains the following components: methodological-objective (social order, the goal, conceptual approaches to specialists training, digitalization factors), constructive-procedural (directions, forms in education organization under education digitalization), professionally-oriented (the content, technologies, methods and means of education), analytical-effective (criteria, the process dynamics indicators, diagnostic instruments), as well as organizational-pedagogic conditions (Figure 3).

It should be noted that singling out the methodological-objective component plays a defining role in ensuring the wholesomeness, systemacy, and success of master's training for higher education teachers under education digitalization. The study of the defined problem in the theory and practice of education enables the conclusion that higher education fulfills a crucial social order—forming Ukraine's intellectual potential, translating national and global pictures of the world, transferring innovative activity products to the socio-economic area, and supporting society's sustainable development.

The goal of a master's degree program is a comprehensive training of competitive teachers who freely operate the acquired competencies in the chosen profession under current dynamic conditions and situations of uncertainty in the information society, are ready for digitalized instruments and processes, and perform their professional pedagogic activities through applying modern teaching- and education technologies under integration into the European community.

Singling out methodological approaches enables shifting orientation at new educational concepts, to secure the link between the theory and the practice, to study academic processes, objects, or phenomena in their dynamics, in a particular environment and their interaction with outer and inner factors, to determine possibilities for implementing the designed model into the actual teaching process of masters' training.

To digitalization factors should be referred, among other things, re-thinking of the teacher's role, flexible models in the education process organization, application of modern digital technologies in the education process, formation of new needs, requirements, values among the participants in the education process, changes in the conditions of a specialist's work in a socio-cultural environment, interactive feedback, the shift in the legal- and regulation base which is currently oriented at mutual penetration of various communications, technologies and databases, the synergy of virtualization, visualization, cloud technologies in data storage, cyber-security organization and information hygiene, readiness for massive innovations and science priority, and others.

According to this study's algorithm, the next step is to render the characteristics of the constructive-procedural component of the structural-functional model of the master's training for higher education teachers under education digitalization.

The directions in future higher education teachers' master's degree training are determined as follows: to ensure the relevance of the master's training program for higher education teachers to the latest European and national tendencies in education sector development; involvement of stakeholders in designing education- and professional programs, teaching plans, determining free-choice education components; introduction of information-, communication- and media technologies to attain formation

of a high level of relevant competences, personality traits in students, their professional growth, a rise in competitiveness in an information-technology digital society.

To organize the digitalized teaching under conditions of distance learning introduced due to martial rule in Ukraine, the following leading forms of master's training in educational sciences were selected: classroom sessions – problem-oriented video-lectures with the application of multimedia resources (presentations, video-reviews, etc.), press-conference lectures, brainstorming lectures, interactive lectures through information programs and platforms with the involvement of exceptional visualization means (Whiteboard, Padlet, ZOOM whiteboard, Google services, LMS Moodle, Office 365, Teams, and others); webinars; practical classes in the form of a game, designing a mini-project, quests, various forms of training content visualization both individual and in joint work with using particular cloud and software technologies (interactive sheets, designing of info-graphics, banners, literary sources lists, etc.); individual work (essays, development of personal learning projects, systemizing via table-drafting services and databases, designing of rills, screen-casts, etc.); individual sessions, consultations (for instance, with the use of webinar services, work via a chat or specially designated social network, etc.), research and development work; participation in grant programs, scientific educational projects, development of a site-type portfolio, advertising one's personal achievements, etc. The most demanded are interactive, problem-oriented, search-oriented, research, visualization, and context learning methods.

The professionally oriented component conditions for attaining a high level in the formation of general, professional, subject-related competencies in accordance with education standards using a proactive application of modern information-computing technologies, methods, and means of information digitalization. Considering the author's experience in teaching the master's degree program in 011 Educational and Pedagogical Sciences, which included delivering lectures in "Information Technologies in Education" via the Office 365 platform and its "Teams" interactive video application, the students were able to take part in developing an information shell based on the main definitions for the subject, as well as real-time questioning owing to the built-in communication system. Video-scribing was very helpful due to the Microsoft Whiteboard application, which allowed the students to visualize theoretical content through their own experience, ideas, knowledge, etc. Students were offered various forms to improve their master's degree training and to form readiness in positioning themselves as specialists under rapid digitalization, in particular, among other things, to form and visualize a professional image of teaching activity, to advertise their profession through designing a banner, info-graphics, or a presentation using one of the applications: Canva, Google Slides, PowerPoint, Prezi, Sway, Infogram, Venngage, Pictochart and others that enable representing work outcomes. Analytical work with databases was carried out owing to cross-platforms and cataloging services like Zotero, Mendeley, Google Scholar, and specialized search engines and social networks (WolframAlpha, SciNet, Science.gov, Publons, and others); also, database formation and systemizing were practiced using information collecting services (for instance, Google Form, SurveyMonkey).

The possibility of having modern information content and demonstrating intellectual products was secured owing to the use of program instruments that assist in video format design, primarily Telegram, Instagram, and YouTube, as well as Windows Movie Maker, DaVinci Resolve, OBS Studio, Scoompa Video, InShot and YouCut, KineMaster, Kizoa, etc. Presently, master's degree students are to understand the specifics of addressing a target audience and, therefore, to apply animated and cartoon formats to develop a dynamic, easy-to-follow information video environment, which has become possible owing to such applications as Avidemux, PowToon, Plotagon, GoAnimate, and others. Interactivity and teamwork were ensured owing to the services that are offered in designing a video format: Kahoot, Quizizz, LearningApps WordWall, etc. The apogee of learning the subject was the development of students' personal portfolios in the form of an individual web page with a limited operation time online by means of using templates or semiautomatic functions for various manipulations (Tilda, Wix, Weby, Google Site, and others). By the time masters start working on their portfolio, they have a sufficient amount of information products that can be involved in their project.

Getting acquainted with various information-communicative programs, cloud services, platforms, and networks enables demonstrating the versatility in the possibilities that digitalization offers for successful professional activity, forming a high education level, providing oneself with intellectual products that make it possible for a master student to present themselves in the education and professional environments.

Considering the outcomes of the content-analysis of research on the studied problem, as well as the legal- and regulation base and the authors' practical work experience, and according to the structural components of the model, namely its analytical-effective segment, the authors have singled out the relevant criteria and indicators for upgrading of the master's training for higher education teachers.

The first, the cognitive-functional criterion, characterizes the mode of the subject's interaction with the instruments and object of work and the extent of the subject's readiness for the specified activity. This criterion is defined by the level of specific competencies formation (general, professional, subject-related), according to the standards in education and the program, and is justly defined by the following indicators: knowledge, skills, facilities, experience, on which successful performance of professional educational activity in a digitalized education environment depends.

The second, the productive-creative criterion, assumes development by a higher education teacher of new intellectual and creative educational products and marketing or implementing them to the education process with accounting for social order and future challenges.

The third, the professional-synergetic criterion, demonstrates an integrative process between the subject's consciousness and self-awareness concerning moral and ethical preconditions for work and readiness for information digitalization and use.

Upgrading the master's training for a higher education teacher within the context of education digitalization based on the proposed model is possible on condition that relevant organizational-pedagogic conditions have been duly formed. In this study, the authors determine the following conditions: forming a personified education environment and providing education innovations to raise the quality of master's training for higher education teachers. In scientific and methodological literature, the notion of "education environment" is viewed in three aspects: as a multidimensional world with numerous levels that engulf a person and form their idea of it, attitude to people, the surrounding reality, and to the environment; as a unity of impacts of establishments and institutions of education, family, public, cultural and information environment; as a total of requirements to the education process according to pedagogical, ergonomic, sanitary- and hygienic norms and standards.

Personification of higher learning education environment under digitalization determines the application of information- and communication technologies, methods, means, and approaches aimed at producing a wholesome education environment for personality development in professional and other areas by their peculiarities, abilities, life plans based on cooperation, communication, mutual understanding, and interaction.

Implementing educational innovations is a token of sustainable progress and a mechanism for uninterrupted development of the education sector, higher education included, and Ukrainian society (Ministry of Digital Transformation of Ukraine, 2021). As a condition for high-quality master's training, the provision of educational innovations is a purposeful process of involvement and application of new constructs, products, ideas, and instruments that facilitate specific improvements. For education process participants, this process is characterized by positive shifts and qualitative changes in the outcomes of mastering the program. The method of involving innovations in the education process of training specialists in educational sciences depends directly on the course of innovative activity that is understood as creative, active work with a system of goals, following fulfillment of which a result is obtained in the form of new products which change the education environment dramatically and cause the arising of new formations relevant for the professional sector of specialists' self-accomplishment.

Provision of educational innovations in the context of master's training is a systematic complex of instruments and the total of processes (forming, implementation, innovations support, etc.) that suppose embodiment of competencies experience into new competitive products, services, or intellectual products or projects based on a scientific foundation to create propositions and demand for them in the market that is the success of intellectual products created by specialists in education sciences and the outcomes of their professional activities.

4. Conclusion and future scope

Socio-cultural factors and modern realities such as globalization, information flow, European integration, and collaboration between higher education institutions and employers greatly influence the current education system. In response to these challenges, it is crucial to train a new generation of master's degree students in educational and pedagogical sciences capable of delivering high-quality education services, organizing training for competitive specialists, and leading in a digital society. The digitalization of the education system has become an urgent need. It is essential to distinguish the digital segment within the education system and integrate digitalization as a strategic direction in socio-cultural progress. The digital industry requires the development of new education strategies, teaching plans, and programs. To address these needs, a structural-functional model for training higher education teachers has been developed. This model includes methodological-objective, constructive-procedural, professionally oriented, and analytical-effective components. Organizational pedagogical conditions have been defined to enhance training efficiency and raise the quality of higher education teachers' master's training.

Upgrading master's training for higher education teachers also involves identifying and considering the peculiarities of the national education digitalizing system. Furthermore, it includes the practical demonstration of distance teaching and learning methods using information technologies and digital instruments and the development of practice-oriented education content.

Emphasizing the importance of continuous professional development, the participants acknowledged the significant impact of digitalization on teaching in public health education. These findings underscore the essential role of digital tools and ongoing training in enhancing pedagogical practices within the realm of public health education in the modern educational landscape. Future changes in the process of master's training for higher education teachers under digitalization will focus on experimental verification of the proposed model's efficiency in national and foreign education environments.

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