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Yuliia Yevtushenko*

PhD in Pedagogy, Associate Professor
State Establishment "Lugansk State Medical University"
33028, 36 16 Lypnia Str., Rivne, Ukraine
<http://orcid.org/0000-0002-7315-3337>

Educational technologies for developing ethical reflection in future doctors within a digital learning environment

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Abstract. The digital learning environment in medical education increasingly influences not only the organisation of the educational process but also the professional and value-based formation of the future doctor. The aim of the article was to theoretically substantiate the potential of educational technologies within the digital learning environment in fostering ethical reflection in future doctors, as well as to determine the pedagogical mechanisms and conditions for the effective use of these technologies in professional training. The methodology of the study was based on a combination of competence-based, axiological, learner-centred, reflective and environmental approaches. Theoretical and comparative analysis, systematisation, generalisation, interpretation and theoretical comprehension of scholarly provisions were used. It was established that the digital learning environment should be considered not only as a technical infrastructure of learning but also as a pedagogically organised space for the professional and value-based formation of the future doctor. It was found that ethical reflection is an integrative result of professional training, manifested in the ability to comprehend the moral content of professional decisions, analyse value-based contradictions in clinical situations, correlate professional expediency with the humanistic orientations of medical activity, and correct one's own professional position in accordance with the ethical requirements of the profession. It was determined that the greatest potential for its formation is possessed by clinical case analysis, problem-based learning, simulation-based learning, virtual patient technology, reflective writing, electronic portfolio, moderated online discussion and pedagogically organised feedback technologies. The pedagogical mechanisms of the influence of these technologies were theoretically substantiated, in particular the problematisation of moral choice, contextualisation of the professional situation, dialogical comprehension, reflective distancing, comparison of alternatives, integration of professional knowledge and value judgement, personalisation of professional experience and transition to internal ethical self-regulation. The pedagogical conditions for the effective use of these technologies in the digital learning environment were determined. The practical significance lies in the possibility of using the results of the study for designing digital courses, clinical cases, simulation scenarios, reflective tasks and models of pedagogical support in the system of professional training of future doctors

Keywords: moral judgement; professional self-regulation; clinical decision-making; value-based learning; medical education; professional training; pedagogical conditions

*Corresponding author
(julia.evtushenko@ukr.net)



INTRODUCTION

The digital transformation of higher medical education is changing not only the organisational forms of teaching, but also the very nature of future doctors' professional development. In today's digital learning environment, medical students in higher education institutions work not only with learning materials, but also with clinical scenarios, simulation models, digital cases, interactive platforms, self-assessment tools, and feedback instruments. These tools and formats expand the possibilities of professional training, while also changing expectations regarding its content and pedagogical logic. Under these conditions, the training of future doctors can no longer be reduced to acquiring knowledge, developing clinical skills, and rehearsing professional algorithms. It increasingly requires the ability to reflect on the moral content of professional decisions, critically analyse complex situations, relate clinical expediency to its ethical implications, and act responsibly towards other people. For this reason, the formation of ethical reflection in future doctors has become especially relevant in the context of the digitalisation of medical education.

Modern research shows growing attention to the digitalisation of medical education, yet the ethical and reflective development of future doctors is not always sufficiently connected with this process. O. Ogundiya *et al.* (2024) examined the potential of digital educational resources in medical training and concluded that the digital environment expands access to learning, increases the flexibility of the educational process and supports students' more active engagement with learning material. S.S. Guraya *et al.* (2024) examined e-professionalism in medicine and showed that digital identity, virtual communication and online interaction are becoming important elements of future doctors' professional behaviour. These findings confirm that the digitalisation of medical education has not only a technological but also a value-based dimension. E. Simou (2025) emphasised that, in the age of artificial intelligence, medical education must maintain a balance between digital opportunities, the development of soft skills, humanistic interaction and future doctors' professional responsibility. L. Çetinkaya *et al.* (2024) analysed the use of a mobile virtual patient application to develop students' clinical reasoning and found that this technology promotes students' more active engagement in analysing clinical situations and supports their decision-making skills. This is of fundamental importance for the stated topic, since a virtual patient can be used not only to develop clinical reasoning but also to interpret the moral consequences of professional choice. Y. Zhu *et al.* (2026) examined the challenges of using digital and intelligently supported tools in the education of future healthcare professionals and stressed that such tools have considerable educational potential but require pedagogical guidance, critical control and ethical interpretation.

A separate area of recent research concerns reflection as a mechanism for the professional development of future healthcare specialists. S. Heydari & A. Beigzadeh (2024) considered reflection an important factor in professional

learning and emphasised that reflective activity helps students become more aware of personal experience, analyse professional actions and move from formal knowledge acquisition to more conscious professional development. At the same time, the ethical dimension of reflection requires separate pedagogical interpretation, since the moral content of a doctor's decision cannot be reduced to general self-analysis. C. Skinner *et al.* (2024) examined the role of reflective practices in medical education and highlighted their link with students' professional self-awareness. The authors showed that reflection acquires educational value when linked to real or simulated professional experience.

Ethics and professionalism in medical education are also actively discussed in scholarly literature. K.C.Y. Leung & C. Peisah (2023) analysed ethical problems in medical practice and emphasised the importance of moral judgement, professional responsibility and the ability to act in situations of value-based ambiguity. This approach shows that doctors' training should cover not only knowledge of ethical norms but also the ability to apply these norms in complex professional situations. D.K. Gupta & A. Chaudhuri (2025), in a systematic review of educational approaches to developing ethics and professionalism in medical education, concluded that the most effective methods involve students in active analysis of situations, discussion of dilemmas, and reflection on professional responsibility. This directly corresponds to the idea that pedagogically organised technologies are needed to transform ethical knowledge into an internal professional position.

Despite current research on the digitalisation of medical education, reflective practices, ethics and doctors' professionalism, the question of how educational technologies within the digital learning environment can purposefully develop future doctors' ethical reflection remains insufficiently addressed. Existing studies mainly analyse either the technological possibilities of digital tools or the general principles of professional ethics, whereas the pedagogical mechanisms for the transition from digital learning interactions to the moral interpretation of a professional decision require separate theoretical justification. The aim of the article was to provide a theoretical justification of the potential of educational technologies within the digital learning environment for developing future doctors' ethical reflection, and to identify the pedagogical mechanisms and conditions for the effective use of these technologies in professional training.

MATERIALS AND METHODS

The methodological basis of the study combined competence-based, axiological, learner-centred, reflective, and environmental approaches. The competence-based approach made it possible to view ethical reflection as an important component of future doctors' professional readiness, expressed in the ability not only to know ethical norms, but also to apply them in situations of professional choice, to analyse the moral complexity of clinical action, and to

relate professional decisions to human consequences. The axiological approach ensured a focus on the value content of medical education and made it possible to interpret the digital learning environment as a space in which not only information is transmitted, but also professionally significant values, norms of responsibility, respect for patients' dignity, ethical sensitivity, and moral self-regulation are formed. The learner-centred approach made it possible to view the student as an active subject of professional development who does not merely perform the proposed learning tasks, but is also involved in interpreting experience, evaluating personal decisions, comparing alternatives, and shaping a personal professional position. The reflective approach became central to revealing the mechanisms by which externally prescribed ethical requirements are internalised and become an internal regulator of professional conduct. The environmental approach made it possible to consider the digital learning environment not as a set of separate technical tools, but as a pedagogically organised space of interaction in which content, technologies, communication, feedback, and the modes of presenting professional situations jointly influence the development of ethical reflection.

Theoretical analysis was applied to clarify the key concepts of the study, primarily the concepts of ethical reflection, educational technologies, digital learning environment, and future doctors' professional training, as well as to identify the semantic links between them. Comparative analysis made it possible to examine different scholarly approaches to understanding reflection, professional ethics, the digitalisation of education, and the pedagogical potential of educational technologies. This method also made it possible to identify points of intersection between these thematic fields and to reveal underdeveloped aspects of the problem. Systematisation was used to organise scholarly views on the types of educational technologies functioning in the digital learning environment and to group these technologies according to the potential influence on the ethical interpretation of professional situations. Generalisation helped to formulate conceptual conclusions about the pedagogical possibilities of the digital learning environment for fostering ethical reflection in future doctors. The interpretative method was used to reveal the internal logic through which educational technologies influence value judgement, moral self-awareness, the analysis of alternatives, and the self-correction of professional position. Conceptual modelling was used to develop a theoretical understanding of how educational technologies within the digital learning environment may contribute to the development of ethical reflection in future doctors.

In the first stage, the study's conceptual field was clarified, and the semantic boundaries of the key categories required for the theoretical analysis of the problem were defined. At the second stage, the specific features of the digital learning environment in the system of future doctors' professional training were examined, and its potential was identified not only for cognitive development but also for value-based and reflective development. At the third stage,

educational technologies potentially productive for fostering ethical reflection were identified and pedagogically interpreted with regard to the specific character of medical education. At the fourth stage, the pedagogical mechanisms through which these technologies influence the moral interpretation of professional situations, the development of value judgement, the capacity for reflective distancing, and the self-correction of a personal professional position were determined. At the fifth stage, the pedagogical conditions under which educational technologies within the digital learning environment may effectively foster ethical reflection in future doctors were formulated.

The source base of the theoretical analysis comprised studies that address the digitalisation of medical education, the use of educational technologies in the professional training of future healthcare specialists, the role of reflection in professional development and the importance of the ethical component in medical education (Ogundiya *et al.*, 2024; Heydari & Beigzadeh, 2024; Sadeq *et al.*, 2025). The selection of these studies was based on relevance to three substantive dimensions of the stated problem: the digital educational environment, students' reflective development, and the ethical dimension of doctors' professional training. Within the study, attention was focused not on the technical characteristics of digital tools but on how digital tools can be used pedagogically in situations of moral choice, professional analysis, and reflective reconsideration of a personal professional position. This perspective was chosen to define the theoretical basis for further analysis of educational technologies as a pedagogical means of supporting future doctors' ethical reflection.

The methodology of the theoretical analysis was based on a consistent movement from the general to the specific: from understanding ethical reflection as a pedagogical phenomenon to characterising the digital learning environment as a space of professional and value-based development; from identifying educational technologies relevant to medical education to revealing the specific mechanisms of technological influence on students' ethical self-determination; and from analysing individual technological solutions to formulating coherent pedagogical conditions for the effective use of these technologies. This logic made it possible to move from describing individual digital tools to a theoretically substantiated understanding of the role of such tools in fostering ethical reflection in future doctors. The selected methodology and the set of methods used made it possible to examine the problem within the interdisciplinary fields of pedagogy, professional education, and medical education, and provided the basis for further theoretical substantiation of educational technologies as a means of fostering ethical reflection in the digital learning environment.

RESULTS AND DISCUSSION

Ethical reflection as a pedagogical outcome of the professional training of future doctors

In the professional training of future doctors, particular importance lies not only in mastering specialised knowledge,

clinical algorithms, and practical skills, but also in developing the ability to understand the moral meaning of professional activity. Medical practice belongs to those fields in which no decision is purely technical, because it is almost always linked to responsibility for another person, patient dignity, safety, the right to choose, trust in the professional, and the consequences of intervention in human life and health. For this reason, the professional training of future doctors cannot be complete without developing the ability to reflect ethically on professional actions, decisions, motives, and position. In this context, ethical reflection appears not as an optional addition to professional education, but as one of the essential outcomes of such education.

In a broad pedagogical sense, reflection is associated with the individual's ability to analyse their personal experience, consider the grounds of actions, assess the appropriateness of these actions, recognise contradictions, rethink individual ways of thinking and behaving, and adjust them in response to new meanings and demands. In professional education, reflection performs a particularly important function, as it enables the transition from external acquisition of knowledge to its internal acceptance, from mechanical compliance with requirements to conscious professional action, and from reproductive learning to personally meaningful professional development (Sydoryako & Sydoryako, 2023; Sarraf-Yazdi *et al.*, 2024; Skinner *et al.*, 2024). M.H. Shah *et al.* (2023) also linked reflective practices in medical education to the development of students' social responsibility and the formation of professional consciousness. This strengthens the understanding of reflection as a mechanism not only of individual self-analysis but also of the value-based development of a future specialist. For future doctors, this is especially important because medical practice requires constant interplay between professional decision-making and its human and moral dimensions.

However, in the training of future doctors, it is not enough to develop only general reflectiveness as the ability to analyse professional activity. What becomes professionally significant is the development of ethical reflection itself, that is, a form of understanding that enables future specialists to see the moral context behind a clinical situation, identify value-based contradictions, recognise the possible consequences of professional decisions for the patient, and assess professional action not only in terms of correctness or effectiveness, but also in terms of ethical justification (Young *et al.*, 2024; Bashkirova *et al.*, 2025). Ethical reflection presupposes the ability to pause before acting automatically, to consider the moral meaning of a professional choice, and to revise a personal professional position in the light of new experience.

In this sense, ethical reflection cannot be reduced to knowledge of codes, norms of professional conduct, or deontological rules. In this context, it is important to consider the position of N. Nychkalo & L. Gutor (2024), who viewed the deontological education of future medical students as a combination of communicative culture, professional norms, and digital learning tools. Knowledge of

norms is a necessary foundation, but it does not, in itself, guarantee the ability to act morally in a real or simulated professional situation. A future doctor may reproduce normative provisions but remain unable to interpret a specific situation in which several values conflict, no standard solution is unambiguous, and professional action requires inner responsibility, tact, empathy, and moral maturity. For this reason, ethical reflection should be regarded as a more complex pedagogical construct than merely a set of ethical knowledge. It involves the internal understanding of professional norms and a readiness to adjust personal professional behaviour.

Within the structure of ethical reflection in future doctors, it is appropriate to distinguish several interrelated dimensions of professional development. The first is cognitive and relates to understanding ethical principles, norms of professional conduct, the nature of medical responsibility, patients' rights, and the moral complexity of medical practice. The second is value-based and concerns the ability to perceive professional activity not merely as the performance of functions, but as service to a person that requires respect, attentiveness, humanity, sensitivity, and responsibility. The third is personal-reflective and is expressed in the ability to analyse personal reactions, motives, attitudes, inner contradictions, and readiness to act in accordance with the ethical requirements of the profession. The fourth may be defined as behavioural-regulatory, since ethical reflection is manifested not only in internal judgements but also in specific decisions, modes of communication, the choice of professional position, and the willingness to bear responsibility for the consequences of professional actions. This approach provides grounds for viewing ethical reflection as an integrative outcome of professional education, combining knowledge, values, self-awareness, moral judgement, and the capacity for self-regulation. Ethical reflection cannot be formed through simple information delivery or normative instruction. It emerges and develops under educational conditions in which students engage with professionally significant situations, encounter moral ambiguity, analyse alternatives, justify a personal position, consider the consequences of decisions, and relate these consequences to the humanistic orientations of the medical profession. Therefore, it develops not through memorising correct answers but by involving future doctors in the practices of moral reasoning, professional choice, and personal self-determination.

Ethical reflection should be regarded as one of the key outcomes of the professional training of future doctors. Y.O. Polkovnikov (2024) emphasised that developing the professional culture of future dentists at the initial stage of training requires purposeful pedagogical organisation. This position corresponds to the interpretation of ethical reflection as an outcome of the educational process. In this context, ethical reflection does not exist outside the educational process as a predetermined personal quality. Rather, this quality is formed through specially organised pedagogical interaction, the substantive content of learning, the nature

of professional tasks, modes of communication and forms of assessment. The dominance of knowledge reproduction and formal control considerably narrows the space for ethical-reflective development. By contrast, involving students in a pedagogically organised analysis of morally complex professional situations, the justification of a personal position, the comparison of alternatives and the reflective review of an adopted decision gradually shifts ethical requirements from the level of external regulation to the sphere of internal interpretation and personal acceptance.

Within this logic, the professional training of future doctors should be directed not only towards the transmission of professionally significant content, but also towards creating conditions for the development of the ability to observe oneself ethically, interpret professional experience, and make conscious moral choices. At the centre of pedagogical attention should be not only what students know about professional ethics, but also how they understand professionally significant situations and adjust their own professional position. This is where the fundamental difference lies between the formal acquisition of ethical information and the formation of ethical reflection as a pedagogical outcome. The ethical reflection of future doctors is a complex integrative construct formed in the course of professional training and manifested in the ability to understand the moral meaning of professional decisions, analyse value-based contradictions, relate clinical expediency to the humanistic orientations of the profession, assess a personal professional position, and adjust it in accordance with the ethical requirements of medical practice. Such an understanding makes it possible to move from a normative interpretation of ethics in medical education to a pedagogical view of the internal appropriation of ethical norms. The next question, then, is how the digital learning environment may serve as a space not only for the professional development of future doctors, but also for their value-based development.

The digital learning environment as a space for the professional and value-based development of future doctors

In the context of the professional training of future doctors, the digital learning environment is increasingly emerging not only as a technical or organisational basis of the educational process, but as a multidimensional pedagogical space within which knowledge acquisition, professional thinking, value orientations, interaction models and reflection on future practice are developed (Ogundiya *et al.*, 2024; Guraya *et al.*, 2024; Kalbus *et al.*, 2024). This approach makes it possible to move beyond understanding the digitalisation of education as merely transferring traditional teaching to electronic platforms. In the professional training of future doctors, it should instead be viewed as a pedagogically organised system that integrates content, communication, feedback, and the modelling of professional situations, and that requires pedagogical guidance, critical control, and ethical interpretation (Zhu *et al.*, 2026).

This understanding is particularly important for medical education. The training of doctors is a complex process that involves not only mastering large bodies of specialised information, but also gradually entering a professional culture, a system of norms and values, forms of professional responsibility, and ways of interacting with patients. In the traditional educational model, these components were largely formed through direct contact with the teacher, clinical practice, observation of a mentor's professional conduct, and discussion of professionally significant situations. In digitalised education, these processes increasingly involve digital interaction, the modelling of professional situations and pedagogically organised communication, which are closely related to the development of e-professionalism, communicative culture and deontological education in digitally supported medical training (Guraya *et al.*, 2024; Nychkalo & Gutor, 2024). This does not diminish the importance of live pedagogical interaction but changes its forms.

One of the defining characteristics of the digital learning environment is its interactivity. Unlike traditional learning, where students often remain primarily recipients of information, the digital environment far more often involves them in active engagement with the material, the task, the situation, the teacher, and other participants in the educational process. In the professional training of future doctors, this means the opportunity not only to access information but also to analyse clinical scenarios, make decisions under simulated conditions, observe their consequences, compare alternatives, participate in discussions, and reconsider one's own responses. It is precisely this kind of interaction that creates the conditions for moving from the passive acquisition of educational content to active, professional, and value-based self-determination.

Equally important is the digital learning environment's capacity to model professionally significant situations. In medical education, this offers especially valuable opportunities, as it allows clinical cases, communicative situations, moral conflicts, and professional dilemmas to be presented in forms that are accessible for analysis, repeated review, group discussion, and pedagogical support. As a result, future doctors gain a space for safely entering the complexity of the profession before direct contact with real clinical practice. In such conditions, students are required not simply to find the correct answer, but to understand the context, identify the contradiction between possible decisions, and justify their own position.

Another important feature of the digital learning environment is its capacity to support asynchronous reflection. In the traditional classroom format, students are often required to respond quickly, without always having enough time to consider a complex situation, especially when it is value-laden and ambiguous. By contrast, the digital format allows them to return to a case, review the prompt again, reread comments, refine their position, compare it with alternatives, and gradually form a more conscious judgement. This form of reflection is of particular pedagogical

value, because ethical reflection requires time for internal dialogue and for the development of a reasoned position.

The digital learning environment also considerably expands the possibilities for feedback and, consequently, for pedagogical support of students' reflective development. Within it, feedback may be individual, group-based, automated, delayed, or interactive, and it may come from both the teacher and peers through discussion, peer assessment, or comments (Heydari & Beigzadeh, 2024). For the formation of ethical reflection, this is crucial, because students gain the opportunity to see the limits or incompleteness of their own judgement, compare their position with other interpretations of the situation, recognise the hidden consequences of a decision, and adjust their own view. Under such conditions, feedback ceases to be merely an instrument of control and acquires developmental significance.

The pedagogical potential of the digital learning environment is further strengthened by its ability to integrate multiple modalities of educational influence. Text, images, audio visual material, the scenario structure of a case, interactive questions, comments, professional roles, and the visualisation of decision outcomes create a multi-layered environment in which a professional situation appears not abstractly, but in its dynamics and context. This is especially important for future doctors because ethical understanding in medicine is shaped not by abstract rules, but by concrete human situations. It is precisely through this multimodality that the digital learning environment can bring the educational situation closer to the real complexity of professional experience.

At the same time, the digital learning environment does not have an automatic ethical-developmental effect. The mere use of an electronic platform, simulation programme, or digital case does not, in itself, mean that ethical reflection is being developed in students. If digital tools are used only to transmit information, assess knowledge, or practise algorithms technically, they may remain didactically useful but have little effect on the value-based understanding of professional content. This limitation is particularly important in view of studies that emphasise the need for pedagogical guidance, critical control and ethical interpretation in the use of digital tools in medical education (Ursin *et al.*, 2024; Zhu *et al.*, 2026). The ethical potential of the digital environment is revealed only when it is pedagogically directed towards the analysis of morally significant situations, stimulates value-based questioning, opens space for comparing positions, justifying choices, and reflectively revising personal decisions. Thus, what is decisive is not the mere presence of digital technologies, but the way they are embedded in the logic of the professional training of future doctors.

In this context, the digital learning environment should be regarded as a space not only for professional but also for value-based development of future doctor. It combines cognitive, communicative, and reflective experience, the modelling of morally complex situations, and different forms of feedback. For this reason, in contemporary medical

education, the digital learning environment should be considered not merely an external technological addition to traditional teaching, but as an important pedagogical resource for fostering ethical reflection in future doctors.

The digital learning environment acquires pedagogical value when it not only provides access to knowledge, but also engages students in understanding professionally significant situations and creates conditions for value-based judgement, reflective analysis, and the self-correction of a professional position. Within this logic, further clarification is needed regarding those educational technologies through which the digital environment can acquire ethical and reflective content.

Educational technologies for forming ethical reflection in future doctors

Understanding the digital learning environment as a space for the professional and value-based development of future doctors naturally raises the question of which educational technologies can most productively shape the development of ethical reflection. In this context, it is important to proceed from the premise that no technology, in itself, has a guaranteed ethical-formative effect. Its pedagogical potential is determined not only by the form of organising learning, but above all by the content it brings into focus, the types of thinking it stimulates, whether it engages students in analysing professionally significant situations, and whether it creates space for value-based choice, argumentation, doubt, reconsideration, and self-correction. Thus, within the professional training of future doctors, the issue is not simply digital learning tools, but technologies that organise students' intellectual and value-based activity.

One of the most productive in this respect is clinical case analysis. Its significance lies in bringing the educational process closer to the real professional situation in which a doctor must make decisions and bear moral responsibility for them (Al-Bedaery *et al.*, 2024). A clinical case almost always contains not only a factual and diagnostic dimension, but also a communicative, emotional, social, and moral context. For this reason, working with cases enables future doctors to perceive a professional situation in its wholeness rather than merely as a task requiring the application of knowledge. In the digital learning environment, this technology offers additional possibilities: cases may have a branched structure and include documents, video fragments, and alternative scenario paths. This enables students not only to search for the correct decision, but also to analyse the situation as morally ambiguous, identify value conflicts, relate clinical expediency to ethical consequences, and form a reasoned professional position.

Similar in logic but broader in pedagogical potential is problem-based learning, in which learning is organised around a problem with no single, obvious solution in advance (Wei *et al.*, 2024; Ota *et al.*, 2026). For the development of ethical reflection, this technology is particularly valuable because it teaches future doctors to act under conditions of uncertainty, incomplete information, competing

alternatives, and the need to justify decisions. It moves students away from the model of passive knowledge reception and engages them in active professional thinking, in which the process of analysis itself, together with the weighing of risks and consequences, becomes important. In the digital environment, this technology may be implemented through interactive scenarios, problem-based modules, digital simulations, collaborative online discussions, and structured tasks for collective solution-seeking. Under such conditions, ethical reflection develops as the ability to think responsibly in a real professional context.

Simulation-based learning also plays an important role in the development of ethical reflection, particularly in those approaches that enable the modelling of professional situations with a high degree of similarity to real clinical practice (Gyamo & Kesari, 2024; Hamilton, 2024). The value of simulation lies in creating a safe space for professional trial, where students can make decisions, make mistakes, and analyse their actions and consequences without putting a real patient at risk. The greatest pedagogical effect is produced by simulations that combine technical action with communicative complexity and moral choice. In the digital learning environment, simulation may take the form of a virtual clinical scenario, an interactive simulator, a branching decision pathway, or a virtual patient model in which each student's decision changes the subsequent course of the situation. In such conditions, future doctors do not merely practise an action, but experience a situation of professional responsibility.

Particular attention should be paid to virtual patient technology, which, in the context of the digitalisation of medical education, has become one of the most promising forms of modelling professional interaction (Çetinkaya *et al.*, 2024; Pavliukovych *et al.*, 2026). Its pedagogical value lies in the fact that students interact not with an abstract task, but with a personified clinical situation involving a medical history, behavioural features, emotional reactions, complaints, communicative barriers, and possible ethical complications. This enables future doctors to see the patient not merely as a carrier of symptoms, but as a person with an individual position, fears, rights, and expectations. Such personification activates the moral and value-based dimension of perception and encourages deeper reflection on the consequences of professional decisions.

Reflective writing also plays an important role in the development of ethical reflection, since written reflective practices in medical education support students' deeper interpretation of experience, professional self-awareness and reconsideration of previous judgements (Shah *et al.*, 2023; Leyland *et al.*, 2024). In the digital environment, it may be implemented through electronic journals, written reflections after cases, reflective essays, responses to structured questions, comments on professional situations, or analytical entries in an electronic course. Unlike an oral response, writing allows students to slow their thinking, formulate an internal position more precisely, and become aware of contradictions. For the development of ethical reflection, this

is especially important, because moral understanding requires not only reaction, but also inner work with meaning. In written form, students are more likely to move beyond the formal reproduction of the correct answer and reveal the logic of personal professional thinking.

Closely related to reflective writing is e-portfolio technology, which has not only an accumulative but also a developmental function. In medical education, e-portfolios are used to document students' educational progress, collect evidence of learning, record narratives of lived experience and support reflective interaction with mentors (Dos Santos *et al.*, 2024). If the portfolio is regarded not as a formal collection of completed tasks, but as a tool for understanding professional growth, it can become an important means of forming ethical reflection. An e-portfolio allows students to revisit previous decisions, observe the development of professional thinking, record changes in judgements, compare previous positions with new experiences, and gradually build a more mature view of professional responsibility. In digital form, this technology is particularly valuable because it allows texts, cases, feedback, and self-assessment to be combined within a single reflective field.

Moderated online discussion is also highly significant for the development of ethical reflection, since educational approaches to ethics and professionalism in medical education are more effective when they involve students in active analysis of situations, discussion of dilemmas and reflection on professional responsibility (Bashkirova *et al.*, 2025). In the digital learning environment, it may take the form of a forum, synchronous or asynchronous discussion, debate, group case analysis, or collective consideration of a professional dilemma. Its value lies in helping students move beyond isolated thinking and recognise that the same professional situation may allow for different ethical interpretations. In the course of discussion, they encounter alternative positions, justify their views, and refine their judgements. It is precisely through this that ethical reflection acquires a dialogic character and moves beyond the limits of an individual inner monologue. It becomes especially valuable when the teacher guides the discussion without imposing a single correct answer.

Feedback technologies also have significant potential when used not as formal comments on outcomes but as a means of pedagogical support for students' professional and value-based development. In medical education, feedback and reflective practices help students reconsider their previous judgements, interpret professional experience more deeply and strengthen professional self-awareness (Heydari & Beigzadeh, 2024). Individual teacher comments, peer assessment, self-assessment, structured error analysis, and the comparison of decisions with different possible consequences all contribute to students beginning to see not only whether a decision was correct, but why it was made in that way, what assumptions stood behind it, which moral aspects remained unnoticed, and where haste or one-sidedness appeared. In this way, feedback becomes a resource for reflective self-knowledge and professional maturation.

In the context of contemporary digital education, the technology of analysing ethical dilemmas with the help of intellectually supported digital tools also appears promising, particularly those that can help structure a professional situation, identify alternatives, pose clarifying questions, propose different scenario pathways, or help students see weaknesses in personal argumentation (Weidener & Fischer, 2023). However, in this case, it is especially important to preserve pedagogical control over the learning process. Such tools may be useful for organising thinking, but they should not replace students' moral judgement. Their value lies not in automatically producing the correct answer, but in supporting more consistent and conscious analysis by students. Therefore, intellectually supported digital tools can be productive only when they are integrated into the pedagogical logic of forming reflection rather than used as a substitute for personal understanding.

The analysis above provides grounds to argue that ethical and reflective potential is not inherent in individual digital tools themselves. Rather, such potential is characteristic of educational technologies that combine professional context, problem-based learning, dialogue, variability in decision-making, analysis of consequences, feedback, and students' involvement in interpreting their own professional positions. The shared pedagogical function of these technologies is not only to transmit educational content but also to create conditions for the moral analysis of a professional situation, the justification of choice and the internal self-determination of a future doctor. This requires further clarification of the pedagogical mechanisms through which technologies within the digital learning environment influence the development of ethical reflection.

Pedagogical mechanisms through which educational technologies influence the formation of ethical reflection

Identifying technologies capable of supporting future doctors' ethical reflection does not, in itself, explain their pedagogical effectiveness. For a theoretical understanding of this problem, it is essential to clarify the internal pedagogical processes through which the digital learning environment acquires ethical and developmental content. This is not a matter of outlining the tools again, but of identifying the mechanisms that influence value-based judgement, the moral interpretation of professional situations and future doctors' self-regulation. It is precisely the analysis of these mechanisms that enables the shift from describing technologies to explaining the process by which ethical reflection is formed.

The formation of ethical reflection in future doctors does not occur through the isolated action of a single digital tool, but through the interaction of several pedagogical mechanisms that progressively complicate students' professional thinking and involve them in the analysis of morally significant professional situations (Tokumasu *et al.*, 2024). Some of them take students beyond algorithmic decision-making and problematise moral choice; others

place professional action within a concrete human context in which clinical expediency can no longer be considered apart from value-based consequences. For this reason, the problematisation of moral choice and the contextualisation of the professional situation do not oppose one another, but reinforce each other. The first undermines the view of professional action as technically unambiguous; the second fills it with real moral meaning. Within this logic, students are required not simply to find the correct answer but to recognise the ambiguity of the situation and take into account its value-based consequences. It is under such conditions that moral understanding moves from the sphere of declarative knowledge to that of professionally meaningful understanding.

It is equally important that ethical reflection not be confined to the student's inner monologue. It is strengthened through dialogue, comparison of positions, peer assessment, and joint case analysis, when future doctors encounter alternative ways of interpreting the same professional situation. In such a comparison, a personal position no longer appears to be the only possible one, and ethical understanding acquires greater depth and justification. Dialogic understanding becomes especially productive when combined with reflective distancing, that is, the ability to step beyond an immediate reaction, look at a personal decision from the outside, and recognise its premises, emotional impulses, unconscious biases, or superficial judgements (Leung & Peisah, 2023). In the professional training of future doctors, this is particularly important, because many decisions in medical practice may be made under the pressure of time, authority, habit, or fear of error. Digital formats that involve returning to a situation, recording a personal position and discussing it further make it possible to slow down thinking and separate the act of making a decision from its ethical meaning. It is precisely through this combination of dialogue and distancing that students move from spontaneous reaction to conscious analysis of personal professional thinking.

A further deepening of ethical reflection occurs through the comparison of alternatives, the anticipation of consequences, and pedagogically organised feedback. Future doctors begin to think ethically when they see not one possible decision, but several professional options, each with its own advantages, limitations, consequences, and moral risks. Such learning formats, which make it possible to model variable scenarios, compare decisions and see how a situation changes depending on the choice made, develop students' ability to think not linearly but responsibly (Çetinkaya *et al.*, 2024). What becomes important here is not only which decision proved correct, but also why other decisions were less justified and what harm such decisions might cause to the patient or to professional trust. At this stage, feedback becomes especially significant because it enables students to see not only the weaknesses or persuasiveness of a decision, but also the logic of the reasoning: what was taken into account, what was overlooked, which values were prioritised, and which were undervalued. In

this way, feedback becomes a means of self-correcting a professional position.

A special role in the formation of ethical reflection is also played by the integration of professional knowledge and value judgement. In medical education, one often encounters a situation in which the ethical component exists alongside the clinical one rather than being built into it. As a result, students may know the professional material well yet fail to view clinical action as having a moral dimension. Educational technologies become genuinely effective in forming ethical reflection when they unite these two planes: when they require students to combine clinical reasoning with value-based judgement, relate professional expediency to respect for the person, and analyse not only the possibility of intervention but also its moral justification (Young *et al.*, 2024). This integration is strengthened through the personalisation of professional experience, when students stop being external observers of the situation and begin to experience it as significant for personal professional development. Educational technologies that enable students to identify with the role of a future doctor, see the situation through the patient's eyes, and assume responsibility for the consequences of professional decisions make the learning experience internally meaningful and value-based (Çetinkaya *et al.*, 2024; Pavliukovych *et al.*, 2026). It is then that students begin to ask not only what should be done, but also what kind of doctor to become, what professional position to choose, and how this decision affects others.

All these mechanisms are ultimately directed towards a gradual transition from external regulation to internal ethical self-regulation. At the initial stages of learning, students often orient themselves towards external norms, instructions, teacher assessment, or prescribed models of correct behaviour. However, the task of professional education is not only to teach them to act according to a rule, but also to develop their ability to apply ethical orientations independently in new, ambiguous, and unpredictable situations. For this reason, the educational technologies in the digital learning environment have pedagogical value only when they do not stop at checking an answer but involve students in understanding motives, evaluating consequences, justifying choices, and revising previous decisions. In such a case, ethical reflection becomes not a response to an external requirement, but an internal regulator of professional behaviour.

The pedagogical influence of technologies within the digital learning environment on the development of future doctors' ethical reflection is realised through the interaction of several interrelated mechanisms: problematising moral choice, contextualising the professional situation, dialogic interpretation, reflective distancing, comparison of alternatives, feedback, integration of professional knowledge and value-based judgement, personalisation of professional experience and a gradual transition to internal self-regulation (Skinner *et al.*, 2024). Within this logic, digital technologies take on significance not only as learning

tools but also as means of supporting the future doctor's internal professional development. This requires defining the pedagogical conditions under which the ethical and reflective potential of these technologies can be realised in professional training.

Pedagogical conditions for the effective use of educational technologies in the digital learning environment

The theoretical substantiation of educational technologies and the pedagogical mechanisms through which they influence the formation of ethical reflection in future doctors naturally leads to the need to identify the conditions under which this potential can be realised in professional training. Digital tools or interactive forms of learning interaction do not, in themselves, ensure an automatic value-based and reflective outcome. The effectiveness of these tools and forms of interaction depends on the pedagogical logic into which they are embedded, the content they bring into focus, and whether they support the transition from external learning activity to the inner understanding of professional responsibility (Ursin *et al.*, 2024). For this reason, the question of pedagogical conditions is crucial to understanding the circumstances under which the digital learning environment genuinely becomes a space for the formation of ethical reflection in future doctors.

Above all, the pedagogically grounded selection of digital tools, aligned with the aim of fostering ethical reflection, is fundamental. In the professional education of future doctors, digital technologies are often introduced for reasons of convenience, modernisation of the educational process, or broader access to learning materials. However, when the issue is ethical and reflective development, what becomes decisive is not the technological novelty of the tool, but its ability to organise morally significant learning activity (Kalbus *et al.*, 2024; Ursin *et al.*, 2024). This means that the choice of a digital platform, simulation resource, or discussion format should be determined not only by technical capabilities but, above all, by whether the tool stimulates analysis of a value-laden situation, argumentation, and self-correction. Only under such conditions does technology acquire pedagogical direction.

Equally important is the inclusion of professionally significant situations with a clear ethical dimension in the learning content. Ethical reflection does not develop on material devoid of moral tension, value ambiguity, or communicative complexity. For the development of ethical reflection, future doctors need to engage with situations in which professional decisions require choosing among several possible courses of action and attending to patient dignity, confidentiality, autonomy, trust, psychological condition, family interests, the risks of intervention, and the tension between clinical expediency and human sensitivity (Tokumasu *et al.*, 2024; Young *et al.*, 2024). If digital educational materials are limited to informative or algorithmic content, they may be useful for knowledge formation, but they do not provide a sufficient basis for ethical understanding.

For this reason, the digital learning environment should include learning situations that involve students in moral analysis, the justification of choice and reflection on the possible consequences of a professional decision.

Another essential condition is the teacher's moderation and pedagogical support. The digital environment considerably expands opportunities for students' independent work, but this does not mean that the process of forming ethical reflection can be left entirely to itself. Ethical understanding of a professional situation requires not only individual activity, but also pedagogical guidance that helps students identify significant aspects of the situation, pose important questions, avoid simplistic conclusions, broaden the analytical perspective, and reach the level of reasoned moral judgement (Nychkalo & Gutor, 2024). The teacher's role lies not in imposing ready-made evaluations, but in creating a space for understanding in which students move from superficial reaction to deeper interpretation of professional experience. For this reason, the pedagogical effectiveness of digital technologies depends largely on the professional moderation of discussions and support for students' reflective activity.

A necessary condition is the creation of a safe educational space for expressing positions, doubt, and error. Ethical reflection does not develop under conditions of fear of giving the 'wrong' answer or being judged for ambiguous reasoning. For future doctors to learn to understand the moral complexity of professional decisions, they must have the opportunity to make assumptions, doubt, revise a personal position, acknowledge the limits of a chosen perspective, and analyse errors without the risk of humiliation or formal devaluation. In the digital environment, this condition becomes especially important, since online communication may both expand the space for reflection and create additional tension. Students, therefore, need to perceive reflective activity not as a test of errorlessness, but as a space for professional growth.

An important condition is the combination of individual and group reflection. Ethical understanding of a professional situation has both an inner and a dialogic dimension. On the one hand, students need time for personal reflection on the situation, for articulating a personal position, identifying doubts, and internally relating the decision to personal value orientations. On the other hand, it is equally important that they have the opportunity to compare their views with those of others, see different ways of interpreting the situation, encounter alternative argumentation, and refine personal judgement in dialogue (Leung & Peisah, 2023). The most effective forms of organising learning interaction are those in which personal interpretation of a professional situation is combined with subsequent dialogic clarification of a personal position. Such a combination makes it possible to avoid both superficial collective reaction and the closed nature of purely individual reflection.

No less important is the systematic use of educational technologies in forming ethical reflection. This quality

does not emerge as an immediate result of participation in a single case, simulation, or discussion. It develops gradually through students' repeated involvement in different forms of moral analysis, professional choice, argumentation, and self-correction (Sadeq *et al.*, 2025). Occasional ethical-reflective tasks may arouse interest, but they do not ensure stable inner development. The effectiveness of digital educational technologies increases when they are integrated into the overall logic of professional training, recur at different stages of learning, and gradually become more complex. It is precisely this systematicity that allows ethical reflection to move from the sphere of one-off educational experience to that of a stable professional disposition.

Equally important is integrating ethical content into the overall structure of professional training. The development of ethical reflection cannot be effective if it remains confined to a single discipline, such as medical ethics or deontology. In real professional practice, the moral dimension is present in clinical decision-making, communication, diagnostic choice, and interactions with patients and the team; therefore, in professional education, it should likewise be integrated into different learning contexts. Technologies within the digital learning environment become more pedagogically effective when the ethical component is embedded in various forms of professionally oriented learning activity rather than functioning separately from the core professional content. Such integration helps students perceive ethical reflection as a natural part of doctors' professional thinking.

Particular attention should also be paid to assessments that focus not only on the result, but also on the student's reasoning process. If only the final answer is assessed in the educational process, students often orient themselves towards reproducing the expected result rather than developing a deep understanding of the professional situation (Tokumasu *et al.*, 2024; Gupta & Chaudhuri, 2025). For the formation of ethical reflection, it is important that attention should also be given to the logic of analysis: whether students considered the value-based aspects of the situation, alternatives, and the possible consequences of the decision. This is especially important in the digital learning environment, since digital tools make it possible to capture not only the final answer, but also the course of the student's work. Such a shift in assessment emphasis makes learning less formal and more supportive of value-based and professional development.

The final, though no less important, condition is coherence between technological form and the humanistic orientation of medical education. The digitalisation of the professional training of future doctors should not lead to the depersonalisation of the educational process, the reduction of the patient to a set of clinical data, or the substitution of professional responsibility with technical proficiency. On the contrary, the use of educational technologies should strengthen attention to the human dimension of the medical profession and its ethical complexity. This means that the digital learning environment should be designed

so that technology does not distance students from the profession's moral meaning but helps them see and interpret it more deeply. Only under this condition does digital educational infrastructure remain aligned with the humanistic orientations of medical education.

The effective use of technologies within the digital learning environment to develop future doctors' ethical reflection is possible when a set of interrelated pedagogical conditions is in place: the purposeful selection of digital tools, ethically rich learning content, teachers' pedagogical support, a safe space for reflection, the combination of

individual and group work, systematic use, the integration of the ethical component into professional training, assessment focused on the reasoning process and the alignment of digital form with the humanistic content of the medical profession (Gupta & Chaudhuri, 2025; Sadeq *et al.*, 2025). Taken together, these conditions transform the digital learning environment into a pedagogical resource for the professional and value-based development of future doctors. The main components of the pedagogical logic of forming ethical reflection in future doctors within the digital learning environment are systematised in Table 1.

Table 1. The pedagogical logic of forming ethical reflection in future doctors within the digital learning environment

Component of the conceptual framework	Content	Pedagogical function	Expected ethical-reflective outcome
Digital learning environment	Interactivity, modelling of professionally significant situations, asynchronous reflection, multimodality, feedback	Creates a pedagogically organised space for professional and value-based development	Students' engagement in morally significant situations and understanding of professional decisions
Educational technologies	Case-based, problem-based, simulation-based, reflective, portfolio-based, discussion-based and feedback-oriented formats of learning interaction	Organise students' intellectual and value-based activity	Transition from acquiring ethical information to active moral understanding of professional action
Pedagogical mechanisms	Problematisation of moral choice, contextualisation of the situation, dialogic understanding, reflective distancing, comparison of alternatives, personalisation of professional experience, self-correction	Transform external learning activity into inner ethical work	Development of moral judgement, professional self-awareness, and a reflective position
Pedagogical conditions	Pedagogically grounded selection of digital tools, ethically rich content, teacher guidance, safe reflective space, combination of individual and group work, systematicity, integration of the ethical component, assessment oriented towards the reasoning process	Ensure the effectiveness of the ethical-reflective influence of educational technologies	Stable integration of ethical reflection into the logic of the professional training of future doctors
Practical educational outcome	Inner professional responsibility, moral understanding of clinical decisions, capacity for reflective self-correction	Captures the pedagogical outcome of digital professional training	Formation of an ethically sensitive, reflective, and professionally mature future doctor

Source: developed by the author based on K.C.Y. Leung & C. Peisah (2023), R. Leyland *et al.* (2024), S.S. Guraya *et al.* (2024), D.K. Gupta & A. Chaudhuri (2025), Y. Zhu *et al.* (2026)

As shown in Table 1, the ethical-reflective potential of the digital learning environment is realised not through any single tool but through the interconnections among the environment, educational technologies, pedagogical mechanisms, and the conditions for the effective use of these technologies. It is this logic that provides the basis for defining the practical significance of the results obtained.

Practical significance of the research findings

The findings may serve as a methodological and applied reference point for designing contemporary professional training at medical higher education institutions. First of all, this concerns the purposeful integration of the ethical and reflective component into educational content, professionally oriented learning situations, tasks for independent reflection and models of pedagogical support for students.

In practical terms, the research results can be used in several specific forms of educational practice. The identified educational technologies may serve as a basis for designing digital modules on medical ethics and

professionalism. The theoretically justified pedagogical mechanisms can be used to develop clinically and ethically oriented cases, simulation scenarios with elements of moral choice, and virtual patient tasks that require students to justify professional decisions. The defined pedagogical conditions may guide the organisation of online discussions, feedback, peer assessment and reflective writing tasks in digital courses. In addition, the proposed understanding of ethical reflection may be used to develop assessment rubrics for evaluating students' ethical reasoning and methodological recommendations for teachers who support future doctors' professional and value-based development.

The proposed provisions help reorient the use of digital educational technologies in medical education from a predominantly instrumental and didactic plane to a value-based and professional plane of student development. Under this approach, the digital educational infrastructure appears not only as a technical means of organising learning but also as a pedagogically guided resource for

developing internal professional responsibility, moral judgement and reflective self-correction.

The findings should be taken into account when developing educational programmes and teaching and methodological support for disciplines related to the professional training of future doctors. This involves designing educational and methodological support so that the ethical component is embedded in the logic of professional thinking, situational analysis, and responsible decision-making, rather than being isolated from professional content. Such an approach is particularly important where student training requires not only mastery of clinical action algorithms, but also the development of readiness to make responsible decisions under conditions of moral ambiguity.

The results obtained are also of particular value for the training and professional development of teachers in medical higher education institutions. The identified pedagogical mechanisms and conditions may serve as reference points in the selection of digital tools, the structuring of professionally significant situations, the organisation of discussion, the design of feedback, and the assessment of the logic of moral reasoning. In this sense, the study is also relevant to improving actual pedagogical practice under conditions of the digitalisation of medical education.

In addition, the formulated provisions may serve as a conceptual basis for the further development of criteria, indicators, and diagnostic tools to assess the development of ethical reflection among future doctors in the digital learning environment. Thus, the practical significance of the study lies in improving the content, technologies, and pedagogical organisation of the professional training of future doctors in line with the contemporary challenges of digital education and the humanistic orientations of the medical profession.

Discussion of the findings in relation to current research

The results obtained are consistent with current studies in which the digitalisation of medical education is viewed not only as an update of learning tools but also as a change in the pedagogical logic of professional training. O.I. Kalbus *et al.* (2024) examined the use of digital solutions in training future healthcare professionals and concluded that the digital environment expands the possibilities for learning interactions but requires pedagogically motivated implementation. N. Zarifsanaiey *et al.* (2024) also noted that the effectiveness of digital educational technologies increases when students are actively engaged. This position is supported, but it also requires clarification: students' activity should be not only cognitive but also value-based and reflective.

Comparison with studies on case-based and problem-based learning is also important. R. Al-Bedaery *et al.* (2024) examined the humanisation of case-based learning and demonstrated that working with clinical cases brings learning closer to the real complexity of medical practice. B. Wei *et al.* (2024) studied problem-based

learning in medical training and found that this approach encourages students to think independently, work with uncertainty, and seek justified decisions. This conclusion is expanded in the present study: problem-based learning is important not only for clinical reasoning but also for developing ethical reflection, since professional uncertainty often involves tensions between values, risks and professional responsibility. Y. Ota *et al.* (2026) also emphasised the importance of problem-based formats for developing active professional thinking. This position is consistent with the result obtained, but it needs to be supplemented by an ethical and reflective dimension.

The results of the study are partly supported by works on simulation-based learning. P.D. Gyamo & S. Kesari (2024) showed that simulation creates safe conditions for practising clinical actions and reduces the risk of error in real practice. This conclusion is supported; however, to develop ethical reflection, simulation should go beyond technical training and include communicative complexity, moral ambiguity and analysis of the consequences of decisions. A. Hamilton (2024) examined the impact of artificial intelligence on simulation-based learning and noted that intelligently supported environments can change the nature of educational interaction. L. Weidener & M. Fischer (2023) also highlighted the potential of digital tools to structure students' thinking, which is consistent with the conclusion that reflective learning requires a pedagogically controlled logic.

A separate group consists of studies on reflective practices. S. Sarraf-Yazdi *et al.* (2024) analysed the importance of reflection for developing the professional self-awareness of future doctors and showed that reflective activity contributes to a deeper interpretation of experience. This corresponds to the results obtained, in which ethical reflection is considered an integrative pedagogical outcome. C. Skinner *et al.* (2024) concluded that reflective approaches are effective when they are linked to a real or simulated professional context. A. Sydoryako & S. Sydoryako (2023) emphasised the role of reflection in the transition from externally imposed requirements to personal professional development, which aligns with the conclusion that ethical reflection supports the shift towards internal ethical self-regulation.

Comparison with studies on ethics and professionalism also confirms the relevance of the results obtained. L.M. Bashkistrova *et al.* (2025) analysed interactive approaches to teaching medical ethics and emotional intelligence and concluded that ethics education should rely on students' active participation, discussion of situations and development of empathy. This is consistent with the proposed interpretation of dialogue understanding, personalisation of professional experience, and pedagogically organised feedback. K. Tokumasu *et al.* (2024) highlighted the complexity of moral choice in medical practice and the need to develop the ability to analyse the consequences of professional decisions. These findings align with the position that problematising moral choice is a key mechanism

for developing ethical reflection. P.D. Young *et al.* (2024) showed that a doctor's professional decision cannot be reduced to technical correctness. This supports the understanding of ethical reflection as the ability to relate clinical appropriateness to the profession's humanistic principles.

At the same time, the results of the study help clarify certain positions in literature. A. Sadeq *et al.* (2025) emphasised the importance of professional responsibility and ethical judgement in the training of future doctors, but this analysis is more focused on the content of professional ethics. In the present study, the emphasis shifts to the pedagogical conditions and mechanisms that enable students to internalise ethical requirements. F. Ursin *et al.* (2024) studied the challenges of digitalising medical education and highlighted the risk of the formal use of digital tools. This caution is supported, as the pedagogical organisation of the digital environment determines whether it becomes a space for professional and value-based development. L. Lytvynchuk & O. Okhrimenko (2025) emphasised the importance of humanistic guidelines in the professional training of future medical specialists. The results obtained complement this approach by showing how humanistic content can be integrated into digital forms of learning interaction.

The synthesis of the analysed sources confirms that modern medical education needs not simply an expansion of digital tools but their pedagogically meaningful use. For this reason, the proposed approach refines existing interpretations: ethical reflection is considered not as a separate humanitarian component but as the outcome of specifically organised work with professional situations, moral choice, and reflective self-correction in the digital learning environment.

CONCLUSIONS

The potential of educational technologies in the digital learning environment to develop future doctors' ethical reflection was theoretically justified in relation to their capacity to organise moral choice, professional dialogue, case analysis, feedback, and reflective self-correction. The study made it possible to view the digital learning environment not only as the technical infrastructure of the educational process but also as a pedagogically organised space that combines professional content, the modelling of clinically

significant situations, communication, feedback and reflective interpretation of professional experience.

Future doctors' ethical reflection was defined as an integrative outcome of professional training, manifested in the ability to recognise the moral content of a professional decision, analyse value-based contradictions, relate clinical appropriateness to the humanistic principles of medical practice and correct a personal professional position. It was shown that such reflection is not formed through the simple assimilation of ethical norms but requires students' involvement in pedagogically organised situations of moral choice, argumentation, dialogue and self-correction. The study established that the greatest ethical and reflective potential lies in educational technologies that provide a professional context, problem-based learning, variability in decision-making, analysis of consequences, dialogic interaction and opportunities to return to previous judgement. The influence of these technologies is realised through the interaction of pedagogical mechanisms: problematising moral choice, contextualising the professional situation, reflective distancing, comparing alternatives, pedagogically organised feedback, personalising professional experience and a gradual transition to internal ethical self-regulation.

The effectiveness of using the digital learning environment to develop ethical reflection depends on a set of pedagogical conditions: the purposeful selection of digital tools, ethically rich content, teacher support, a safe space for expressing a personal position and analysing mistakes, the combination of individual and group reflection, systematic work, the integration of the ethical component into professional training and assessment focused on the logic of students' reasoning. The results obtained can be used to improve digital educational practices in medical higher education institutions. Further research should focus on empirically verifying the proposed provisions and developing criteria for assessing the formation of future doctors' ethical reflection.

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Юлія Євтушенко

Кандидат педагогічних наук, доцент

Державний заклад «Луганський державний медичний університет»

33028, вул. 16 Липня, 36, м. Рівне, Україна

<http://orcid.org/0000-0002-7315-3337>

Освітні технології формування етичної рефлексії майбутніх лікарів у цифровому навчальному середовищі

Анотація. Цифрове навчальне середовище в медичній освіті дедалі більше впливає не лише на організацію навчального процесу, а й на професійне та ціннісне становлення майбутнього лікаря. Метою статті було теоретично обґрунтувати потенціал освітніх технологій цифрового навчального середовища у формуванні етичної рефлексії майбутніх лікарів, а також визначити педагогічні механізми й умови ефективного використання цих технологій у професійній підготовці. Методологія дослідження ґрунтувалася на поєднанні компетентнісного, аксіологічного, особистісно орієнтованого, рефлексивного та середовищного підходів. Використано теоретичний і порівняльний аналіз, систематизацію, узагальнення, інтерпретацію та теоретичне осмислення наукових положень. Встановлено, що цифрове навчальне середовище доцільно розглядати не лише як технічну інфраструктуру навчання, а як педагогічно організований простір професійного й ціннісного становлення майбутнього лікаря. З'ясовано, що етична рефлексія є інтегративним результатом професійної підготовки, який виявляється у здатності осмислювати моральний зміст професійних рішень, аналізувати ціннісні суперечності клінічних ситуацій, співвідносити професійну доцільність із гуманістичними орієнтирами лікарської діяльності та коригувати власну професійну позицію відповідно до етичних вимог професії. Визначено, що найбільший потенціал для її формування мають аналіз клінічних випадків, проблемно-орієнтоване навчання, симуляційне навчання, технологія віртуального пацієнта, рефлексивне письмо, електронне портфоліо, модернована онлайн-дискусія та педагогічно організовані технології зворотного зв'язку. Теоретично обґрунтовано педагогічні механізми впливу цих технологій, зокрема проблематизацію морального вибору, контекстуалізацію професійної ситуації, діалогічне осмислення, рефлексивне дистанціювання, зіставлення альтернатив, інтеграцію професійного знання і ціннісного судження, персоналізацію професійного досвіду та перехід до внутрішньої етичної саморегуляції. Визначено педагогічні умови ефективного використання цих технологій у цифровому навчальному середовищі. Практичне значення полягає в можливості використання результатів дослідження для проектування цифрових курсів, клінічних кейсів, симуляційних сценаріїв, рефлексивних завдань і моделей педагогічного супроводу в системі професійної підготовки майбутніх лікарів

Ключові слова: моральне судження; професійна саморегуляція; клінічне рішення; ціннісно орієнтоване навчання; медична освіта; професійна підготовка; педагогічні умови