

Lyamar L. V.¹, Vezhnovets T. A.², Tytykalo V. S.¹,
Demydenko Ya. S.¹, Kolomiets T. V.¹

Soft Skills versus Digital Competencies in the Medical Curriculum of the Future: A Comprehensive Review

¹ Bogomolets National Medical University, Kyiv, Ukraine

² Business School of Bogomolets National Medical University, Kyiv, Ukraine

Лимар Л. В.¹, Вежновець Т. А.², Титикало В. С.¹,
Демиденко Я. С.¹, Коломієць Т. В.¹

М'які навички та цифрові компетенції у програмі підготовки медиків майбутнього: комплексний огляд

¹ Національний медичний університет

імені О. О. Богомольця, м. Київ, Україна

² Бізнес-школа Національного медичного університету імені О.О. Богомольця, м. Київ, Україна

lesyalymar@nmu.ua

Introduction

Medical education is at a transformative crossroads now. With integration of artificial intelligence (AI), telemedicine, electronic health records, and digital diagnostics, the healthcare service delivery has already been fundamentally changed [1–3]. This promises unprecedented achievements in healthcare effectiveness [4–5], which brings concerns about the erosion of basic “live” physician competencies, including clinical reasoning, communication and teamwork skills, which have been emphasized till the present time [6–8], and also about the medical curricula future. The question is: will digitalization substitute real physicians? If yes, should medical education prioritize digital literacy to prepare physicians for an AI-powered healthcare system? Or should it dwell on soft skills to preserve the irreplaceable human face of medicine?

Or is the future of medical education somewhere between these two domains, like some authors state [1; 9; 10].

The purpose of the research is to critically review medical education and didactic literature to identify future curriculum recommendations.

Object, materials and research methods

Used by the authors include: non-systematic narrative review of medical, sociological and didactic literature. Database searches were conducted to identify relevant peer-reviewed sources, complemented by purposive selection and citation tracking, which included four major academic databases: Google Scholar (250 papers across two query variations), PsycInfo (25 papers across two variations) and PubMed (30 papers across one variation). The search strategy used keywords and Boolean operators related to medical students, medical education, soft skills, communication, digital skills. The initial search yielded

305 papers, which were screened for relevance, which resulted in 150 papers. Records were screened for relevance to soft skills and digital competencies in medical education. The top 51 papers, representing the most relevant and high-quality evidence, form the evidence base for this review.

Research results

Both healthcare and related to it medical education are undergoing digital transformation characterized by the integration of AI-powered tools, telemedicine platforms, electronic health records, and big data analytics [4; 11; 12]. This results in better diagnostic accuracy, reduction in medical errors, and perfected service performance [13; 14]. The AI is widely used in medicine for the examination data analysis, predicting treatment, and personalizing patient therapy [15; 16], thus, substituting human physicians. This use was necessitated by the COVID-19, which revealed all limitations of digital health. Nowadays, the digitized healthcare environment is considered as basic for both medical students and physicians [12; 16; 17].

However, this raises numerous concerns about overreliance on technology leading to drastic drop in medical skills quality, depersonalization of interaction, digital bias and the prospective that the technology could substitute humans overall [18; 19]. This raises doubts on the degree up to which machines can substitute humans in medicine and in medical education particularly. However, medicine is about treating humans by humans, so, the communication skills in medicine should therefore be prioritized even more. The essential soft medical skills providing patient-centred care include those of effective communication, empathy, compassion, clinical judgment, etc [15; 20], as they affect the quality of the doctor-patient relationship [20; 21]. Patients value physicians who listen attentively, communicate clearly, demonstrate empathy [22], which further results in adherence to the treatment and patient-reported improved outcomes [23]. AI nowadays

cannot provide compassionate presence and empathy, not to mention its mistakes and hallucinations [24], and live communication has nothing common with automated study [25]. This has led to a renewed emphasis on humanistic education and soft skills development in medical students and practicing physicians [26].

The authors note several conceptual frameworks of integration of soft skills and digital competency into the medical education. Here, the Humanistic Medicine – AI-Enabled Education (HuMe-AiNE) framework includes four key components: standardization and individualization of AI competencies; integration of AI tools throughout the curriculum; combining technological solutions with humanistic patient care; and (developing a professional identity including technological and humanistic capabilities [1]. This framework joins both humanistic and digital education.

Another option is the Digital Health Competencies in Medical Education (DECODE) framework, which organizes digital health competencies into four groups: professionalism in digital health, patient and population digital health, health information systems, and health data science [22]. Here the digital competencies are prioritized over the soft skills.

The M.A.G.I.C. (Medical, Art, Generative AI, Innovation, Care) approach proposes framework that balances medical knowledge, empathy, and digital technologies [10]. The Canadian Medical Education Directions for Specialists (CanMEDS) framework includes technology-enhanced learning with emphasis on core communication [19].

The proposed models have common principles, including integration of both soft skills and digital competencies, preservation of human values and adaptation to local contexts. However, it's important to distinguish on the significance of the soft skills over the digital competencies.

Soft skills in medical education is a complex multi-mode formation which includes a range of competencies: productive communication, empathy, ethical reasoning, teamwork, leadership, emotional intelligence, and the ability to build therapeutic relation [27]. These skills are often “humanistic” competencies, although they require emotional and cognitive involvement [28; 29]. Digital Competencies include the knowledge, skills, and attitudes required to use digital technologies in healthcare: digital health literacy, telemedicine, understanding of AI, cybersecurity and data privacy [24]. The literature provides equally important significances for both soft and digital skills in medical education.

Teaching the soft skills develops components which could not be provided by machines by their definition. So, training of communication skills leads to improved patient satisfaction and health outcomes [30], empathy training through reflective practice improves physicians' ability to provide patient-centred care [31], simulation training develops teamwork and clinical reasoning skills [32]. The role-playing helps to shape the interaction skills, which

could not be automatized [33], and early patient exposure develops humanistic attitude and feeling of belonging to profession [14; 34].

As it was said before, there are numerous concerns about the erosion of these skills by the digitized curriculum. Thus, authors raise concerns about cheating as an outcome of education digitalization, with resulting drop of medical students' abilities [35–37]. Some authors state that the digital tools overuse may lead to depersonalization of medical care due to loss of interaction abilities by the medical students and physicians [7; 38]. Even medical students expressed concerns about their readiness for professional interaction due to poor communication learning [39]. This suggests that there is a growing need for the medical soft skills cultivation during the training process. Moreover, the soft skills represent an essential part of the postgraduate and continuous medical education [40], and these skills should be reinforced throughout all training period [41].

On the other side, digital competencies are indispensable in the medical curricula. Surveys of medical students reveal significant gaps between the digital skills they possess and those necessary for practice in healthcare systems [42], which includes gaps in E-health skills. This may lead to anxiety before the practice and dropping out from profession.

Digital medical education and AI training help gain the skills of digital work, although many skills are acquired through practice. The main task of medical education digitalisation is also fostering the critical reasoning skills, which include, firstly, analysis of the AI-suggested options [43]. The advantages of digital learning include accessibility and asynchronous learning, which are particularly important for the war- and crisis- affected environments [44], its cost-effectiveness and ability to practice scenarios without danger to the patients' health [45]. It includes virtual simulations, AI-driven chatbots, and digital platforms for collaboration [19].

However, challenges exist in digital competency education. The technology develops so rapidly that it becomes hard to define the appropriate technologies which to study, particularly in the countries, where technical progress comes late, and the medical teachers lack appropriate skills [46]. Overreliance on digital tools, particularly in conditions of technical difficulties, can lead to medical decisions with poor outcomes, which require high soft skills level for their resolution.

Thus, it is impossible to distinguish between the importance of the digital and soft skills in medical education. Both are important, whilst digital skills are considered to be essential in the future, and the soft skills make a base for the present medical practice. The two directions complete each other's value, as the good soft skills are essential for explaining the AI recommendations to the patient, obtaining consent for digital health intervention [17], and the AI competencies could be used while expanding the soft skills by working with the chatbot, emotional intellect programs, etc. [47]. The analysis

suggests that the most effective medical education approach is neither soft skills alone nor digital competencies, but their integration guided by patient-centred values. Digital technology can improve the quality of medical interaction, although digitalization is impossible without proper level of patient-centre communication.

As for the medical pedagogy itself, the review showed numerous approaches for developing soft skills and digital skills in medicine. Simulation medical learning with standardized patients is successfully applied for teaching empathy and communication [14], allowing students to make mistakes and perfect their skills in safe environment, without harm to the patients. Group discussions and reflective writing represent another method for developing empathy in physicians [48]. Role-playing fosters communication and teamwork skills [49], and early clinical exposure during practice and internship allow students to develop trusting relations with patients and shape their professional identity [13]. Self-reflection introduced as a curriculum part helps students to study their emotions and biases [31], develop self-awareness.

Reflective practice encourages students to examine their own emotional responses, biases, and professional development [4]. Structured reflection on clinical encounters helps students develop self-awareness and emotional intelligence.

Teaching digital competence uses various approaches, including hybrid learning with online and offline modules, aimed to improve digital skills [50]. Special digital courses cover the basic concepts necessary for medicine, including both theory and practice issues. Integration throughout the curriculum combines digital competencies within existing courses, while in some countries digital skills are taught as separate modules [7; 51]. Students learn about work with electronic health records, telemedicine platforms, clinical decision support systems, and other tools they will use in practice [12]. Case-based teaching using AI tools helps students integrate the AI into clinical reasoning [4], where they analyse all opportunities and drawbacks of the digital technologies and the AI. A broader perspective is given by the interdisciplinary teaching, involving healthcare informaticians, data scientists, and other digital health professionals [39].

However, concerns exist about potential negative outcomes from imbalanced curricula, with overemphasized digital technologies, without sufficient soft skills training, which may lead to depersonalization of clinical interactions [8], or, insufficient digital training which will provide the students with poor digital skills and make their practice thus impossible [42]. So, integrated approaches produce the most favorable outcomes, teaching the «tech-enabled humanistic physicians».

The Train-the Trainer (TTT) courses address faculty development needs, teaching the academic staff sufficient digital expertise to teach these competencies [16].

The future of medical education is in collaboration of the two approaches, the soft skills and the digital skills approaches, which includes teaching medicine

itself, nursing, informatics, data science, and health policy [7]. This fosters understanding of digital health and doctor-patient live interaction and communication as a collaborative endeavor.

Discussion of the research results

The review shows the common principles of such integration, including early introduction of soft skills and digital skills into the medical curriculum, longitudinal reinforcement, case-learning, critical reasoning emphasis, patient-centred teaching, and institutional policy aimed at such combination. There is a strong consensus that successful medical education reform requires integration of both soft skills and digital competencies [1; 9]. It requires additional frameworks of how to guide this, including institutional support and prioritizing of both humanistic and technological competencies; embedding both throughout the curriculum; emphasis on critical thinking; and development of professional identity.

The review identifies multiple challenges in implementing integrated curricula, as the curriculum is usually densely packed, which requires integration of the digital and communication courses into the existing courses, as well as accepting the importance of the skills on the institutional level and promoting them as the institutional policy. Unfortunately, staff expertise level sometimes is far from perfection, especially related to digital competencies [16; 39]. The TTT courses require institutional investment, which also correlates with the institutional policy [51]. Finding the right balance between teaching critical thinking or communication and digital skills is challenging. The other challenges include resource limitations including lack of digital infrastructure, limited access to technologies, and insufficient funding [42]. Assessment challenges include difficulty in creating assessment tools, particularly for the humanistic skills direction, which require extra protocol and communication skills. Cultural and attitudinal barriers may include resistance from academic staff and tutoring physicians who view digital health as peripheral and unimportant to core medical education, general concerns about technology replacing humans, and institutional resistance to curriculum reform [7; 22].

Despite these challenges, the review emphasizes that implementation is both necessary and feasible with appropriate planning, resources, and institutional commitment.

Medical curriculum reform requires supportive policy and accreditation frameworks, in order to integrate both soft skills and digital competencies, with clear definition of role of each, definite learning outcomes and assessment. The future of the medical education is seen as that incorporating digital dimension with emphasis on humanistic competencies, adopted by the institution, representing the institutional policy, and supported by all its members. It requires initial curriculum mapping related to soft skills and digital competencies, piloting

and evaluating its results, TTT courses, interprofessional partnerships and student engagement. Continuing medical education requirements should also include both humanistic and digital competencies, supporting lifelong learning as technologies and best practices evolve, which needs educational research, institutional leaderships and international cooperation. All this will lead to innovation of curriculum, development of staff, improvement of digital infrastructure and further research on the themes, which, in its turn, requires additional funding from the government, professional organisations, healthcare and other stakeholders.

Prospects for further research may include mixed-evidence methods on medical students' personality formation by fostering their soft skills and digital skills, particularly those studying under the crisis.

Prospects for further research

Prospects for further research may include mixed-evidence methods on medical students' personality formation by fostering their soft skills and digital skills, particularly those studying under the crisis.

Conclusions

The future of medical education is not in choosing between soft skills and digital competencies but in their synergistic integration. The review demonstrates that both domains are essential for teaching medical students

to practice effectively in 21st-century healthcare systems. Digital technologies offer vast opportunities for diagnostic accuracy and operational efficiency, but they cannot replace the humanistic dimensions of care, represented with the soft skills block: empathy, communication and the therapeutic relationship. The evidence reveals important synergies between soft skills and digital competencies. Digital technologies can improve soft skills training through virtual patients and AI-powered learning. Conversely, soft skills enhance effective use of technology through communication. A crucial bridge between them is the critical thinking. Successful curriculum reform requires comprehensive approaches guided by patient-centred values, introduced as a combination of both domains, through competency-based education, blended learning approaches, interprofessional collaboration, and TTT courses. Implementation challenges include curriculum space, academic staff expertise, rapid technological change, and resource limitations. The goal is to develop «tech-enabled humanists», physicians with strong digital skills and humanistic attitude to patients, able to critically evaluate AI, integrate technological recommendations with patient values, maintain therapeutic relationships, and make ethically sound decisions about technology use.

Medical teachers, physicians, stakeholders and healthcare leaders must work collaboratively to implement integrated curricula that prepare future physicians for this dual model, as the future of medicine requires both technological expertise and humanistic care.

Bibliography

1. Jong M. Transforming medical education in the AI era: Balancing technological expertise with humanistic care in tomorrow's doctors. *Ann Acad Med Singap.* 2024 Dec 12;53(12):754–7. doi: 10.47102/annals-acadmedsg.2024242
2. Simou E. The growing importance of soft skills in medical education in the ai era: balancing humanistic care and artificial intelligence. *IME.* 2025 Nov 21;4(4):50. doi:10.3390/ime4040050
3. Schick K, Reiser S, Mosene K, Schacht L, Janssen L, Thomm E, et al. How can communicative competence instruction in medical studies be improved through digitalization? *GMS Journal for Medical Education.* 2020;37(6):Doc57. doi: 10.3205/ZMA001350
4. Shuja N. Reforming medical education in the digital age: integrating ai, ethics, and empathy: ai, ethics, and empathy: reforming medical education. *Dev med life sci.* 2025;2(5):1–3. doi: 10.69750/dmls.02.05.0135
5. Sobirov Qobuljon G'ofirjon o'g'li. Digital diagnostics of medical students' communicative and organizational competencies in medical education. *European International Journal of Pedagogics.* 2025;5(09):54–59. doi: 10.55640/eijp-05-09-11
6. Yeoh K. The future of medical education. *Smedj.* 2019;60(1):3–8. doi: 10.11622/smedj.2019003
7. Tumuhimbise W, Theuring S, Atukunda EC, Godfrey MR, Babirye D, Kaggwa F, et al. Enablers and challenges of integrating digital health into medical education curricula: a scoping review. *Discov Educ.* 2025;4(1):316. doi: 10.1007/s44217-025-00793-z
8. Fedorchenko Y, Zaiats L. Digital transformation of medical education: the role of artificial intelligence. *Arch clin med.* 2025;31(1):38–41. doi: 10.21802/acm.2025.1.1
9. Anawati M. Virtual care in undergraduate medical education: perspectives beyond the pandemic. How medical education can support a change of culture towards virtual care delivery in Canada. *Can Med Ed J.* 2022;13(4):92–9. doi: 10.36834/cmej.73879
10. Ho J, Toh P, Yap K. A digital health humanities approach to the three-body problem in healthcare education: balancing the science, art and tech with M.A.G.I.C. In: Bichel-Findlay J, editor. *Studies in Health Technology and Informatics* [Internet]. IOS Press; 2024 [cited 2026 Mar 1]. Available from: <https://ebooks.iospress.nl/doi/10.3233/SHTI240894> doi:10.3233/SHTI240894
11. Lina Mosch. Digital health in the medical curriculum: addressing the needs of the future health workforce [Internet]. EMSA Secretariat; 2019. Available from: https://emsa-europe.eu/wp-content/uploads/2023/07/Digital-Health-in-the-Medical-Curriculum_-_Addressing-the-Needs-of-the-Future-Health-Workforce-AA19.pdf
12. Zainal H, Xin X, Thumboo J, Fong KY. Medical school curriculum in the digital age: perspectives of clinical educators and teachers. *BMC Med Educ.* 2022 Dec;22(1):428. doi: 10.1186/s12909-022-03454-z
13. Miguez-Pinto JP, Garcia-Rosa B, Maggitti-Bezerril M, Ramalho C, Garcia SL, Pustilnik HN, et al. The medical student of the future: redefining competencies in a transformative era. *Front Med.* 2025 Jun 16;12:1593685. doi:10.3389/fmed.2025.1593685

14. Han ER, Yeo S, Kim MJ, Lee YH, Park KH, Roh H. Medical education trends for future physicians in the era of advanced technology and artificial intelligence: an integrative review. *BMC Med Educ.* 2019 Dec;19(1):460. doi: 10.1186/s12909-019-1891-5
15. Alrassi J, Katsufakis PJ, Chandran L. Technology can augment, but not replace, critical human skills needed for patient care. *Academic Medicine.* 2021 Jan;96(1):37–43. doi: 10.1097/ACM.0000000000003733
16. Zheng H, Zhang X. Psychiatry in the age of AI: transforming theory, practice, and medical education. *Front Public Health.* 2025 Sep 29;13:1660448. doi:10.3389/fpubh.2025.1660448
17. Sauerbrei A, Kerasidou A, Lucivero F, Hollowell N. The impact of artificial intelligence on the person-centred, doctor-patient relationship: some problems and solutions. *BMC Med Inform Decis Mak.* 2023 Apr 20;23(1):73. doi: 10.1186/s12911-023-02162-y
18. García Castro G. Nuevas perspectivas en la educación médica en Colombia: tecnología, humanización e inteligencia artificial. *Rev Médica Risaralda.* 2024 Dec 5;30(2):5–8. doi: 10.22517/25395203.25719
19. Asadi M, Karimian Z. Advancing medical education: assessing technology-enhanced learning through the lens of the canadian medical education directions for specialists (canmeds) framework – a perspective study. *Health Science Reports.* 2025 Aug;8(8):e71171. doi: 10.1002/hsr.2.71171
20. Armendi AJD, Marek EA. Pedagogical shifts in medical health education. *CE.* 2013;04(06):20–2. doi: 10.4236/ce.2013.46A004
21. Hanley PJ, Ting AE, Tsokas K, Bates J, McFarland R, Salzman R, et al. Advanced therapies require soft skills: insights from a National Academies Working Group. *Cytotherapy.* 2026 Apr;28(4):102063. doi: 10.1016/j.jcyt.2026.102063
22. Car J, Ong QC, Erlikh Fox T, Leightley D, Kemp SJ, Švab I, et al. The digital health competencies in medical education Armendi AJD, Marek EA. Pedagogical shifts in medical health education framework: an international consensus statement based on a Delphi Study. *JAMA Netw Open.* 2025 Jan 31;8(1):e2453131. doi: 10.1001/jamanetworkopen.2024.53131
23. Apondo S. Beyond Communication: Expressing the language of humanity in medicine. perspectives on medical education. 2026 Feb 23;15(1):185–7. doi: 10.5334/pme.2136
24. Roda S. Digital skills for doctors – explaining european doctors' position. *journal of European CME.* 2021 Jan 1;10(1):2014097. doi: 10.1080/21614083.2021.2014097
25. Paranjape K, Schinkel M, Nannan Panday R, Car J, Nanayakkara P. Introducing artificial intelligence training in medical education. *JMIR Med Educ.* 2019 Dec 3;5(2):e16048. doi: 10.2196/16048
26. Hernández-Zumet J. E., Fernández-González J. P., González-Pérez J., García-Thompson J. C. Professional Practice in Health: Towards an Essential Integration of Vocation, Ethics and Social Skills. A systematic review. *Medical Research Archives.* 2025;13(6). doi: 10.18103/mra.v13i6.6651.
27. Kumar JR. Practice of soft skills for excellence: quality and successful life for doctors. *Indian Journal of Public Health.* 2025 Oct;69(4):377–8. doi: 10.4103/ijph.ijph_1046_25
28. Song Y, Lafond CM, Vincent C, Kim MJ, Park CG, McCreary LL. Critical soft skill competencies that clinical nurse educators consider important to evaluate in nurses. *Nursing Open.* 2024 Oct;11(10):e70047. doi: 10.1002/nop.2.70047
29. Steinmair D, Zervos K, Wong G, Löffler-Stastka H. Importance of communication in medical practice and medical education: An emphasis on empathy and attitudes and their possible influences. *WJP.* 2022 Feb 19;12(2):323–37. doi: 10.5498/wjp.v12.i2.323
30. Omelchuk S, Lyman L, Yarymbash K, Lystopad D, Kylymnyk I. Some characteristics of therapy and rehabilitation students' communicative competence (Bogomolets National Medical University). *Wiadomości Lekarskie.* 2025 May 30;(5):1184–8. doi: 10.36740/WLek/204128
31. Matusiewicz D, Aulenkamp J, A. Werner J. Effekte der digitalen Transformation des Krankenhauses auf den Wandel des Berufsbildes Arzt. In: Klauber J, Geraedts M, Friedrich J, Wasem J, editors. *Krankenhaus-Report 2019* [Internet]. Berlin, Heidelberg: Springer Berlin Heidelberg; 2019 [cited 2026 Mar 4]. p. 101–14. Available from: http://link.springer.com/10.1007/978-3-662-58225-1_8 doi: 10.1007/978-3-662-58225-1_8
32. Salhi HE, McKenna K, Gage CB, Powell JR, Collard L, Miller MG, et al. Prevalence and impact of simulation substitution on paramedic educational program success: a national examination. *Cureus.* 2026 Jan 30. doi: 10.7759/cureus.102626
33. Akturan S, Türk Y. Drama use in simulation-based trainings for health professions: a scoping review. *Med Humanities.* 2026 Feb 25;medhum-2025-013677. doi: 10.1136/medhum-2025-013677
34. Holderried F, Sonanini A, Philipps A, Stegemann-Philipps C, Herschbach L, Festl-Wietek T, et al. Using AI to train future clinicians in depression assessment: feasibility study. *JMIR Med Educ.* 2026 Feb 12;12:e87102. doi: 10.2196/87102
35. Micicoi G, Ollivier M, Argenson JN. AI in orthopedics: how to measure one's real contribution and avoid cheating? *Orthopaedics & Traumatology: Surgery & Research.* 2026 Jan;104616. doi: 10.1016/j.otsr.2026.104616
36. O'Dea X, Bale R, Chiu YLT, Suleymenova K, Tinker A, Stoker R. Ethical uses of generative AI in assessment: student perceptions in UK contexts. *Eval Rev.* 2025 Nov 17;0193841X251399712. doi: 10.1177/0193841X251399712
37. Lyman L, Kuchyn I, Bielka K, Puljak L. Academic misconduct and artificial intelligence use by medical students, interns and PhD students in Ukraine: a cross-sectional study. *BMC Med Educ.* 2025 Oct 27;25(1):1496. doi: 10.1186/s12909-025-08100-y
38. Lee SY. Transforming relational care values in ai-mediated healthcare: a text mining analysis of patient narrative. *healthcare.* 2026 Feb 2;14(3):371. doi: 10.3390/healthcare14030371
39. Machleid F, Kaczmarczyk R, Johann D, Balčiūnas J, Atienza-Carbonell B, Von Maltzahn F, et al. Perceptions of digital health education among european medical students: mixed methods survey. *J Med Internet Res.* 2020 Aug 14;22(8):e19827. doi: 10.2196/19827
40. Gathu C. Facilitators and barriers of reflective learning in postgraduate medical education: a narrative review. *journal of medical education and curricular development.* 2022 Jan;9:23821205221096106. doi: 10.1177/23821205221096106
41. Wenhang S, Shenting Z, Shaohua C. Prospects for the development of medical professionalism education in the AI perspective: A qualitative study of Chinese postgraduate medical students' written reflections. *Medical Teacher.* 2025 Sep 2;47(9):1535–43. doi: 10.1080/0142159X.2024.2445056

42. Khurana MP, Raaschou-Pedersen DE, Kurtzhals J, Bardram JE, Ostrowski SR, Bundgaard JS. Digital health competencies in medical school education: a scoping review and Delphi method study. *BMC Med Educ.* 2022 Dec;22(1):129. doi: 10.1186/s12909-022-03163-7
43. Gerlich M. AI tools in society: impacts on cognitive offloading and the future of critical thinking. *societies.* 2025 Jan 3;15(1):6. doi: 10.3390/soc15010006
44. Vasylyshyna NM. Benefits of digital learning application at universities. *Zhytomyr Ivan Franko state university journal Pedagogical sciences.* 2020 Dec 31;0(4(103)):61–8. doi: 10.35433/pedagogy.4(103).2020.61-68
45. Bandas IA, Palytsia LM, Skobeieva OA. Pros and cons of distance learning for medical students under quarantine conditions. *MO.* 2021 Dec 16;(3):72–6. doi: 10.11603/m.2414-5998.2021.3.12598
46. O'Doherty D, Dromey M, Loughed J, Hannigan A, Last J, McGrath D. Barriers and solutions to online learning in medical education – an integrative review. *BMC Med Educ.* 2018 Jun 7;18(1):130. doi: 10.1186/s12909-018-1240-0 PubMed PMID: 29880045; PubMed Central PMCID: PMC5992716.
47. Tang Z, Liao J. Unlocking emotional resilience: Exploring the impact of AI-enhanced support systems on EFL teachers' burn-out and EFL students' well-being in modern classrooms. *Acta Psychologica.* 2025 Oct;260:105672. doi: 10.1016/j.actpsy.2025.105672
48. Lim JY, Ong SYK, Ng CYH, Chan KLE, Wu SYEA, So WZ, et al. A systematic scoping review of reflective writing in medical education. *BMC Med Educ.* 2023 Jan 9;23(1):12. doi: 10.1186/s12909-022-03924-4
49. Huang LJ, Huang HC, Chuang CL, Chang SL, Tsai HC, Lu DY, et al. Role-play of real patients improves the clinical performance of medical students. *Journal of the Chinese Medical Association.* 2021 Feb;84(2):183–90. doi: 10.1097/JCMA.0000000000000431
50. Kuhn S, Jungmann F. Medizin im digitalen Zeitalter: Telemedizin in der studentischen Lehre. *Radiologe.* 2018 Mar;58(3):236–40. doi: 10.1007/s00117-017-0351-7
51. Shapovalov S, Zinchenko O, Petukhova I, Kas I. Postgraduate medical education in Ukraine: addressing modern challenges. *Wiadomości Lekarskie.* 2025 Dec 30;(12):2823–9. doi: 10.36740/WLEK/214417

Purpose. The aim of the study was to critically review medical education and didactic literature in order to compare the roles of soft skills and digital competencies in medical education, synthesize evidence on teaching strategies and challenges, and identify curriculum recommendations for both domains.

Materials and methods. The study was designed as a non-systematic narrative review of medical, sociological and didactic literature. The materials included peer-reviewed publications and conceptual papers on medical education, communication, digital competence, artificial intelligence, telemedicine and curriculum reform. Sources were identified through database searches, purposive selection and citation tracking. The analysis focused on conceptual frameworks, teaching methods, benefits, risks and curriculum implications.

Results. The review showed that healthcare and medical education increasingly rely on AI tools, telemedicine, electronic health records and big-data analytics. These technologies may improve diagnostic accuracy, reduce errors and support new learning formats, yet excessive dependence on them may weaken clinical reasoning, depersonalise care, increase bias and create concerns about the replacement of clinicians. Soft skills remain essential for patient-centred care. Their development is supported by simulation with standardised patients, role-play, early patient exposure, discussion and reflective writing. Digital competence is fostered through hybrid learning, digital-health modules, AI-supported case-based learning and interdisciplinary teaching.

Conclusions. The future of medical education lies not in choosing between soft and digital skills, but in their integrated development. Curriculum reform should prepare tech-enabled humanistic physicians who critically use digital technologies while preserving empathy, communication and therapeutic relationships.

Key words: medical education, soft skills, communication, digital skills, AI.

Мета. Проаналізувати дидактичні, медичні та соціологічні джерела щодо формування м'яких навичок і цифрових компетентностей у медичній освіті для визначення концептуальних орієнтирів оновлення навчальних програм підготовки медиків. Особливу увагу приділено зв'язку між цифровізацією охорони здоров'я, розвитком штучного інтелекту, телемедицини, електронних медичних записів, аналітики великих даних та необхідністю збереження гуманістичного, пацієнт-орієнтованого характеру медичної практики.

Матеріали та методи. Матеріалами дослідження стали джерела, присвячені медичній освіті, м'яким навичкам, комунікації, емпатії, цифровій компетентності, штучному інтелекту та телемедицині. Метод дослідження – несистематичний описовий огляд літератури. Пошук джерел здійснювався у базах Google Scholar, PsycInfo та PubMed із використанням ключових слів і Boolean-операторів за термінологією «студенти-медики», «медична освіта», «м'які навички», «навички комунікації», «цифрова компетентність», «штучний інтелект», «телемедицина». Первинний пошук надав 305 джерел; за тематичною відповідністю було відібрано 150 праць, із яких 51 найбільш релевантна публікація сформувала доказову базу огляду.

Результати. Установлено, що застосування штучного інтелекту, електронних медичних записів та аналітики великих даних підвищує ефективність організації медичної допомоги. Водночас надмірне застосування технологій може послаблювати навички клінічного мислення. М'які навички є незамінними компонентами пацієнт-орієнтованої допомоги. Доцільно формувати їх шляхом застосування методів симуляційного навчання, стандартизованих пацієнтів, рольові ігри, обговорення в групах. Цифрову компетентність варто розвивати шляхом запровадження гібридного навчання, кейс-орієнтованої роботи зі ШІ та інтеграції цифрових технологій у навчальні програми.

Висновки. Найбільш перспективною є модель підготовки технологічно компетентного та водночас гуманістично орієнтованого лікаря. Критичне мислення виступає містком між цифровими та м'якими навичками. Успішне оновлення медичних програм потребує застосування змішаного навчання, міжгалузевої співпраці, підготовки викладачів, чітких критеріїв оцінювання та сталої підтримки закладів.

Ключові слова: медична освіта, м'які навички, комунікація, цифрові навички, ШІ.

Conflict of interest: absent.

Конфлікт інтересів: відсутній.

An AI tool was used to proofread and correct the text (language, punctuation, and readability). It was not used to generate data, perform analyses, or draft the substantive sections; the authors reviewed and approved all edits.

Information about the authors

Lyamar Lesya Volodymyrivna – Doctor of Pedagogical Sciences, Professor, Director of Academic Center for Continuing Professional Education of the Institute of Postgraduate Education of the Bogomolets National Medical University; Beresteyskyi Avenue, 34, Kyiv, Ukraine, 03057.

lesyalymar@nmu.ua, ORCID ID: 0000-0002-9407-1066 ^{A, C, D, F}

Vezhnovets Tetyana Andriivna – Doctor of Medical Sciences, Professor, Director of Academic Center “Business School of Bogomolets National Medical University”; Beresteyskyi Avenue, 34, Kyiv, Ukraine, 03057.

taveg1962@gmail.com, ORCID ID: 0000-0003-1156-8614 ^{E, F}

Tytykalo Volodymyr Serhiiovych – Doctor of Economic Sciences, Professor, Vice-Rector on Academic and Economic Affairs of Bogomolets National Medical University; Tarasa Shevchenka Blvd., 13, Kyiv, Ukraine, 01601.

tytykalo@nmu.ua, ORCID ID: 0000-0001-9461-5521 ^{A, F}

Demydenko Yaroslava Serhiivna – PhD in Philosophy, Associate Professor, Associate Professor of the Department of Philosophy, Bioethics, and History of Medicine at Bogomolets National Medical University, Head of the Scientific and Research Department at Bogomolets National Medical University; Tarasa Shevchenka Blvd., 13, Kyiv, Ukraine, 01601.

demydenko@nmu.ua, ORCID ID: 0000-0002-5683-136X ^{D, E}

Kolomiets Tetiana Viacheslavivna – PhD, Associate Professor, Associate Professor at the Department of Language Studies, Bogomolets National Medical University; Beresteyskyi Avenue, 34, Kyiv, Ukraine, 03057.

tetianakolomiets@nmu.ua, ORCID ID: 0000-0002-5335-7789 ^{B, D}

Дата першого надходження статті до видання: 06.04.2026

Дата прийняття статті до друку після рецензування: 08.06.2026

Дата публікації (оприлюднення) статті: 14.07.2026.