Educación Médica

ORIGINAL ARTICLE

Systematic theoretical study on the application of reflective practice in enhancing medical students' learning experience

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Abstract

Introduction: This study systematically examines current approaches to implementing reflective practice in medical education, with the aim of optimising the professional training of future physicians.

Materials and methods: The research focuses on the transformative impact of digital technologies, particularly the integration of specialised platforms and artificial intelligence (AI), in creating a personalised and continuous learning environment. Emphasis is placed on the development of emotional intelligence and a conscious approach to learning, which underpin critical thinking and clinical decision-making. Empirical data were drawn from the use of reflective diaries, group discussions, and complex clinical case analyses. These methods were found to deepen students' understanding of medical practice. The study proposes the establishment of a unified digital ecosystem combining tools for group reflection, individual support, and AI-based analysis.

Results: AI integration into the interpretation of reflective records enables identification of individual developmental trajectories and supports tailored feedback for clinical reasoning improvement. Longitudinal reflective courses embedded in the core curriculum contribute to sustained professional growth by fostering intellectual humility, emotional intelligence, and professional empathy. Moreover, structured reflection enhances students' resilience in the face of clinical challenges and promotes mindfulness as a core professional skill. The combination of digital and interpersonal reflective practices thus supports the multidimensional development of future doctors, preparing them for emotionally demanding and ethically complex healthcare environments.

Conclusions: The most effective strategy combines traditional reflective learning with digital innovation. Electronic portfolios, automated reflection analysis, virtual case simulations, and interactive platforms supported by AI offer a multidimensional and adaptive educational environment that promotes personalised professional development.

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Estudio teórico sistemático sobre la aplicación de la práctica reflexiva Para mejorar la experiencia de aprendizaje de los estudiantes de medicina

Resumen

Introducción: Este estudio examina de manera sistemática los enfoques actuales para la implementación de la práctica reflexiva en la educación médica, con el objetivo de optimizar la formación profesional de los futuros médicos.

Materiales y métodos: La investigación se centra en el impacto transformador de las tecnologías digitales, en particular la integración de plataformas especializadas y la inteligencia artificial, en la creación de un entorno de aprendizaje personalizado y continuo. Se pone especial énfasis en el desarrollo de la inteligencia emocional y un enfoque consciente del aprendizaje, que constituyen la base del pensamiento crítico y la toma de decisiones clínicas. Los datos empíricos se obtuvieron a partir del uso de diarios reflexivos, discusiones grupales y análisis de casos clínicos complejos. Se observó que estos métodos profundizan la comprensión de los estudiantes sobre la práctica médica. El estudio propone el establecimiento de un ecosistema digital unificado que combine herramientas para la reflexión grupal, el apoyo individual y el análisis basado en IA.

Resultados: La integración de la IA en la interpretación de los registros reflexivos permite identificar trayectorias individuales de desarrollo y proporciona retroalimentación personalizada para mejorar el razonamiento clínico. Los cursos reflexivos longitudinales, incorporados al currículo central, contribuyen al crecimiento profesional sostenido al fomentar la humildad intelectual, la inteligencia emocional y la empatía profesional. Además, la reflexión estructurada fortalece la resiliencia de los estudiantes ante los desafíos clínicos y promueve la atención plena (mindfulness) como una habilidad profesional fundamental. La combinación de prácticas reflexivas digitales e interpersonales favorece así el desarrollo multidimensional de los futuros médicos, preparándolos para entornos sanitarios emocionalmente exigentes y éticamente complejos.

Conclusiones: La estrategia más eficaz combina el aprendizaje reflexivo tradicional con la innovación digital. Los portafolios electrónicos, el análisis automatizado de la reflexión, las simulaciones virtuales de casos y las plataformas interactivas respaldadas por IA ofrecen un entorno educativo multidimensional y adaptable que favorece el desarrollo profesional personalizado.

Introduction

The modern medical education system faces increasing demands for effective teaching methods that can produce competent healthcare professionals. As medical practice becomes more complex and technology advances, the need for innovative educational approaches has intensified.

Reflective practice is recognised as a key pedagogical strategy to enhance medical students' learning outcomes. However, its mechanisms for influencing clinical reasoning, emotional intelligence, and professional identity formation remain underexplored. A systematic analysis of reflective practice is essential to identify evidence-based strategies for its effective implementation as medical education adapts to technological changes and evolving competency-based standards.

Research on reflective practice in medical education reveals several key areas. Rogers et al.[1] developed a validated questionnaire to assess reflective practice in medical students. Complementing this, Richards et al.[2] analysed the relationship between reflective practice and clinical reasoning, emphasising the need to integrate reflective techniques into critical thinking development. Lim et al.[3] conducted a large-scale review of reflective writing, identifying patterns impacting professional development. Ní Mhurchú and Cantillon[4] explored the "hidden curriculum" in reflective practice, shedding light on institutional barriers.

Emotional aspects of reflective practice are also vital. Seeberger et al.[5] highlighted the importance of empathy, while Mjølstad and Getz[6] examined the link between emotional experience and professional development through students' reflective writings. Schei et al[7] emphasised intellectual humility in reflection. Digitalisation further impacts reflective practice. Lewis and Hayhoe[8] explored AI's potential in reflective practice, while Lefroy et al[9] studied the role of reflective writing in enhancing learning. Désilets et al[10] presented an innovative longitudinal course for professional identity formation. Despite significant research, the long-term impact of reflective practice on clinical thinking, standardisation of assessment methods, and integration of digital tools remains underexplored.

This study aims to provide a substantiated theoretical framework for reflective practice in undergraduate medical education by analysing current approaches, identifying key efficacy factors, and exploring the integration of digital tools. The following objectives were formulated to achieve the set goal:

1. A systematic analysis of existing approaches to the integration of reflective practice into medical education was to be conducted.
2. The key factors influencing the effectiveness of the use of reflective methods in teaching medical students were to be identified.
3. Recommendations for optimising the use of reflective practice in medical education were to be developed.

Materials and methods

A systematic literature review was conducted on articles published between 2019 and 2024, utilising PubMed, Scopus, and Web of Science databases. Keywords included "reflective practice", "medical education", "emotional intelligence", "clinical thinking", "longitudinal courses" and "digital learning platforms". The search yielded 243 articles, from which 74 were shortlisted. After applying inclusion criteria (peer-reviewed studies in English focused on reflective practice in medical education), 30 articles were selected for in-depth analysis. These sources helped identify and systematise theoretical provisions, methodological approaches, and practical recommendations for organising reflective practice in medical education.

The key findings from the analysis were used to create classifications of existing reflective practice approaches, their effectiveness criteria, and their evolution, reflected in comparative tables. Key factors influencing effectiveness, organisational, technological, and personal were also examined, with performance indicators and criteria developed for each factor. The study also explored the integration of digital tools, such as e-portfolios and AI, into traditional teaching formats and their impact on reflective practice quality.

Moreover, the emotional component of reflective practice was analysed, with a focus on developing emotional intelligence and professional empathy in medical students. The integration of emotional reflection into professional training was studied, leading to the development of classifications for reflective practice organisation. Institutional support, including mentoring systems and the creation of reflective learning centres, was also explored, with a focus on overcoming institutional barriers and creating a supportive educational environment.

Results

Modern approaches to integrating reflective practice into medical education

The following results are derived from a systematic synthesis of 30 peer-reviewed articles analysed in this study. The materials were grouped according to key thematic domains identified during qualitative coding, including reflective writing, group reflection, emotional intelligence development, technological integration, and longitudinal course design.

Reflective writing has proven to be an effective method of developing the professional thinking of future doctors, as evidenced by numerous studies over the past five years. Students who regularly practice structured written reflection demonstrate a deeper understanding of clinical cases and develop skills of critical analysis of their own experience. The systematic maintenance of reflective diaries helps future doctors not only to record the knowledge gained but also to rethink it in the context of real practice, which significantly affects the quality of learning and the formation of professional competencies.[3] An important aspect of written reflection is its integration into the daily practice of medical students – from clinical case analysis to the analysis of ethical dilemmas. Regular written reflection contributes to the development of metacognitive skills and helps students to better understand personal learning processes, which affects their ability to make informed clinical decisions.[9]

Group reflection opens new opportunities for collective learning and exchange of experience between medical students. Interactive seminars, clinical case studies and interdisciplinary discussions create an environment where students can discuss complex cases, share doubts and learn from the experiences of their colleagues. This format of reflection is particularly valuable for developing emotional intelligence and professional empathy in future doctors. Studies demonstrated that students who regularly participate in group reflection sessions are better able to cope with the emotional challenges of medical practice and demonstrate a higher level of professional resilience.[5] Clinical reviews in the format of group reflection allow students to see different approaches to solving medical problems and develop teamwork skills necessary in modern medical practice.[2]

In medical education, reflective practice is essential for students' development, allowing them to link theory to practice and understand the implications of their actions. This reflection helps students analyse both successes and failures, deepening their clinical understanding.[6] The integration of digital technologies into this process has expanded opportunities for documenting and analysing experiences, with platforms and apps enabling structured record-keeping and real-time feedback.[8] Virtual simulations and e-portfolios further enhance the reflective process, supporting long-term professional development.[2]

AI is transforming reflection by analysing students' records to provide personalised advice on their professional growth. AI helps identify themes in students' reflections, guiding them to areas that need further attention. Longitudinal reflective courses offer a continuous learning process, tracking students' development and enhancing their clinical competence and readiness for real-world practice.[8]

Emotional reflection is crucial for developing empathy and resilience, key aspects of medical professionalism.[10] Reflecting on emotional experiences in clinical settings helps students cope with stress and prevent burnout. Moreover, intellectual humility, recognising the limits of one's knowledge, is fostered through reflective practices,

enhancing clinical thinking and decision-making.[7] Reflective practice needs validated methods of assessment. Research has shown that a comprehensive approach, combining qualitative and quantitative evaluation, effectively tracks students' progress.[4] However, there is still a need to better understand the long-term impact of reflective practices, the standardisation of assessment methods, and the integration of digital tools.[1]

Table 1 shows the differences between the old and new methods of teaching future doctors the skills of professional analysis. The comparison demonstrates the key features of different approaches to learning.

Research over the past five years demonstrated a trend towards an integrated educational environment where traditional methods of reflection are enriched by innovative technological solutions. This synergy creates a more effective system of training medical professionals capable of continuous professional development, critical thinking and empathetic interaction with patients. The balance between technological innovations and the preservation of a deeply personal component in reflective practice is becoming particularly important, which creates the basis for the formation of a new generation of doctors ready to meet the challenges of modern medicine.

Key factors in the effectiveness of reflective methods

The effectiveness of reflective methods in medical education is determined by the complex interaction of institutional structures, personal characteristics of students and methodological approaches to the organisation of the educational process. The "hidden curriculum" – the unwritten rules and traditions in medical schools – strongly influences the way future doctors learn to reflect on their work. The study of curricula showed that for students to better analyse their experience, it is necessary to change not only official documents but also established learning habits. COVID-19 has pushed medical schools to abandon their usual teaching methods and look for new ways faster.[11]

Organisational support for reflective practice requires a comprehensive infrastructure, including technical, methodological and human resources. Successful educational programmes are characterised by the integration of reflective components at all levels of education, from basic sciences to clinical practice. The introduction of e-learning systems significantly expands the possibilities for organising reflective practice but requires the incorporation of many factors that affect the effectiveness of online education in the medical field.[12] The way a medical student can work with their feelings and moods determines their ability to learn from their own experience. The ability to understand and manage emotions is especially important – it helps to better master the skills of professional self-analysis. Research shows that the better a future doctor understands emotions, the easier it is for them to empathise with patients. Such students are more successful in medical tasks and communicate better with patients.[13,14]

To become a doctor, students must learn to recognise emotions – both personal and those of others. Those with better emotional comprehension are not only more empathetic and attentive but also more adept at handling medical work, especially in surgery, where emotional intelligence enhances teamwork and communication with patients in critical situations.[15,16] Recognising one's limits fosters growth, as students who acknowledge their limitations learn faster and analyse complex cases more thoroughly. Studies show that those who admit what they do not know succeed more often in medicine.[17] In a rapidly evolving field, continuous learning is essential.

Reflective practice aids decision-making skills, which are crucial for all doctors. Integrating virtual simulations with

Table 1 Comparative analysis of methods of reflective practice in medical education (2019−2024).

Characteristics	Traditional methods	Innovative approaches
Basic instruments	Reflective journals, group discussions, face-to-face clinical reviews	Digital platforms, AI analysis systems, virtual simulations, e-portfolios
Training format	Mostly face-to-face with a fixed schedule	Hybrid with asynchronous participation
Duration of programmes	Short-term modules (1−2 semesters)	Integrated long-term courses (whole period of study)
Assessment methods	Qualitative assessment by the teacher, self-assessment	Multimodal assessment using analytical tools
Feedback	Periodic, mainly from the teacher	Continuous, from multiple sources (teachers, peers, AI)
Integration with practice	Discrete, linked to clinical rotations	Continuous, with ongoing documentation of experience
Level of personalisation	Standardised approach with elements of customisation	Adaptive learning paths based on data analysis
Competence development	Focus on clinical skills and critical thinking	Comprehensive development of professional identity

Note: Peers − fellow students participating in a mutual learning and assessment programme; multimodal assessment includes a combination of quantitative and qualitative methods, including automated text analysis, peer review, self-assessment and peer review; professional identity refers to a set of competencies, including clinical skills, emotional intelligence, ethical thinking and the ability to continuously develop professionally.
Source: compiled by the authors.

reflective analysis helps develop decision-making in complex clinical situations.[18] This approach is particularly relevant in competency-based medical education (CBME), where reflection bridges theory and practice.[19] Leadership in healthcare relies on emotional intelligence and the Big Five personality traits, enabling doctors to manage teams effectively and make informed decisions in complex situations.[20−22] Research confirms emotional intelligence is key for effective medical team leadership.[23]

Self-reflection among medical students plays a major role in their development as physicians. Regular reflection improves learning and medical skills, especially in modern medicine, where physician demands are high. Students who reflect on their practice better understand challenges and witness their professional growth. Monitoring their progress through proven methods ensures comprehensive assessment and supports personalised learning, enabling mastery of medicine.

The analysis of the key factors of the effectiveness of reflective methods can be used to systematise the data obtained and present them in the form of a comparative table reflecting the relationship between the various components of reflective practice in medical education (Table 2).

As a result of the analysis of the factors of the effectiveness of reflective practices in medical education, their interrelated nature becomes evident. Institutional structures create the basis for the development of student's personal qualities, while methodological approaches ensure the practical implementation of reflective practices. The recognition that emotional intelligence, critical thinking and intellectual humility are not formed in isolation, but in close interaction with each other, is particularly important. This comprehensive approach to analysing the physician experience helps to bring a new perspective to the education of health professionals. Modern technology complements a deep understanding of how people learn and develop. Success comes not by simply adding new learning elements, but by creating a holistic learning system. In this system, all parts work together, reinforcing each other, and helping to produce doctors who meet the challenges of modern medicine.

Recommendations for optimisation of reflective practice

Optimising reflective practice in medical education requires a structured and holistic approach. Weekly sessions of 60 to 90 min in small groups (8 to 10 students) are recommended, ensuring continuity from preclinical years to clinical training. A psychologically safe environment should be prioritised to foster openness and trust.

A progressive programme should begin with basic reflection tools, such as diaries and group discussions, and evolve into analysing complex clinical cases and ethical dilemmas. Each stage should have specific learning objectives and assessment standards. A unified digital platform is essential for integrating e-portfolios, group reflection tools, feedback mechanisms, and mobile apps that enable real-time, bedside reflections. Asynchronous functionality ensures accessibility despite the constraints of clinical schedules. To evaluate students' reflective growth, a combination of automated analysis and qualitative feedback should be employed. AI can help identify key learning patterns, while educators and peers assess depth, insight, and critical thinking. Flexibility must be retained to accommodate diverse learning trajectories.

Teacher development is equally vital. Training should enhance facilitation skills, feedback delivery, and educator self-reflection, as these directly impact the quality of student engagement. Establishing institutional centres for reflective practice, promoting collaboration through

Group of factors	Components	Impact on the educational process	Performance indicators
Institutional	The hidden curriculum	Developing informal rules and values for learning	Level of integration of reflection into daily practice
	Organisational support	Creating an infrastructure for reflective learning	Availability of resources and tools for reflection
Personal	Emotional intelligence	Developing empathy and professional communication	Quality of interaction with patients
	Intellectual humility	Capability for continuous learning	Willingness to admit and learn from mistakes
	Critical thinking	Developing clinical thinking	Quality of clinical decision-making
Methodological	Performance evaluation	Standardisation of outcome measurement	Objectivity in assessing progress
	Temporal aspects	Systematicity of reflective practice	Sustainability of acquired skills
	Integration with practice	Linking theory to clinical experience	Applicability of knowledge in real life

Table 2   Interrelation and influence of key factors on the effectiveness of reflective practice in medical education.

Note: hidden curriculum implies a set of implicit norms, values and practices that influence the educational process; effectiveness is assessed by a set of quantitative and qualitative indicators; all components are interconnected and influence each other in the learning process; performance indicators are measured throughout the entire period of study.
Sources: compiled by the authors based on.[17,20,22]

workshops and conferences, and supporting communities of practice can foster sustained methodological improvement. Emotional well-being must also be addressed. Counselling support, regular monitoring for burnout, and peer group discussions enhance students' resilience in high-stress clinical environments. Programmes should be continuously evaluated based on stakeholder feedback to remain responsive and adaptive. This comprehensive strategy, combining curricular innovation, digital technologies, educator support, and mental health initiatives, can transform reflection from a formal requirement into a foundational element of professional identity formation (Table 3).

Discussion

The study of new ways of teaching future doctors shows that the core approach to medical education should be changed. To teach medical students self-reflection, it is necessary to address several directions at once. It is necessary to use modern technologies, to develop the ability to understand emotions and to help them become doctors.

In the context of emotional intelligence development, the findings demonstrate the importance of structured reflection in the formation of psychological resilience and professional competencies of future doctors. Skokou et al.[24] demonstrated a correlation between how medical students recognise personal emotions and mental health at the beginning of the courses. Being able to analyse their feelings was found to help them adjust more easily to a new learning environment and cope better with stress. New technologies that help students analyse their experiences also make an important contribution to their mental health. When students regularly reflect on experiences and feelings, they learn to better understand themselves and manage their emotions. This is especially relevant in medical education, where psychological stress is very high. By developing the ability to understand their emotions through constant reflection on their experiences, future doctors become more resilient to stress and better prepared to deal with difficult patient situations.

This aspect of emotional development is further supported by the study of Yusoff et al.,[25] devoted to the analysis of the relationship between emotional intelligence and professional burnout in medical students. The results of this study significantly extend the presented conclusions, demonstrating the effectiveness of a comprehensive approach to burnout prevention through systematic reflective practice. Of particular importance is the revealed influence of digital tools on maintaining the regularity of reflexivity and the formation of sustainable mechanisms of professional adaptation. The integration of reflective practices into the

Table 3 A comprehensive system of recommendations for reflective practice optimisation in medical education.

The direction of optimisation	Specific recommendations	Expected results	Criteria for successful implementation
Organisational and methodological	Implementation of weekly reflection sessions (60−90 min)	Systematisation of reflective practice	Regularity of sessions
	Formation of small groups (8−10 students)	Improving the quality of feedback	Student engagement and participation
	Integration into the main schedule	Continuity of the reflexive process	Coverage of all stages of education
	Creation of a safe psychological environment	Openness of discussions	Level of trust in groups
Technology	Development of a single digital platform	Centralisation of reflective tools	Frequency of platform use
	Implementation of mobile applications	Accessibility of reflection "at the bedside"	Number of documented reflections
	Automate the analysis of reflective records.	Objectification of the assessment	Accuracy of analytical data
	Integration of AI assistants	Feedback personalisation	Relevance of recommendations
Practical for teachers	Organisation of facilitation training	Improving the quality of moderation	Competence of facilitators
	Development of constructive feedback skills	Learning quality improvement	Student satisfaction
	Building a community of practice	Exchange of experience and best practices	The activity of the professional community
	Support of self-reflective development	Professional development of teachers	Quality of teaching

Note: A safe psychological environment is defined as an atmosphere where students can openly discuss their professional challenges without fear of criticism; Success criteria should be assessed both quantitatively and qualitatively; AI assistants include systems for automatic text analysis and recommendation generation; Community of practice means a regularly interacting group of teachers who share their experience of implementing reflective practices.
Sources: compiled by the authors based on.[1,8,13]

digital educational environment creates additional opportunities for the timely detection of signs of emotional exhaustion and professional stress, allowing the development of individualised strategies to support students. Continuous self-reflection helps future doctors to better cope with emotions and not burn out emotionally, which is critical when the workload during their studies is high. It has been observed that those students who regularly reflect on their experiences have an easier time adjusting to being a doctor. This suggests that students need well-considered psychological support, including both face-to-face meetings and support through modern technology.

Developing the topic of professional stability, the results of the study by Doyle et al.[26] on the relationship between stress, anxiety and emotional intelligence in medical students are noteworthy. The study demonstrated that sharing experiences helps students develop defences against occupational stress. For the first time, it was possible to study how group work teaches future doctors to cope with the challenges of the profession together. Modern technologies make such group work even more useful. They allow for constant communication between students and highlight signs of overwork in future doctors. When students meet regularly to discuss their experiences, a real mutual supportiveness develops between them. Sharing experiences and supporting each other becomes a regular part of their studies. These regular meetings help to develop reliable ways of coping with stress, which is very important for medical students whose studies are emotionally demanding.

The analysis revealed a significant correlation between how often medical students reflect on their experiences and their ability to empathise with patients. When future doctors constantly analyse their work with patients, they learn to better understand feelings and experiences, even in the most challenging situations. This is evident in difficult cases where patients experience fear or anxiety before treatment. Fragkos et al.[27] confirmed that specific empathy training has good results. This study extends previous knowledge and shows how it is precisely the sharing of physicians' experiences that helps to develop the ability to understand and communicate with patients. It is particularly valuable that this approach teaches future doctors to find a common language with different people and to consider their fears and hopes related to treatment. It proved to be important that constant analysis of their work helps future doctors not only learn to empathise but also to maintain this ability throughout their studies. This ability becomes part of being a doctor and helps to build trust with patients.

A significant addition to understanding reflection's role in developing professional empathy is the study by Hojat et al.,[28] which revealed that empathic abilities tend to decline during clinical training. Their findings suggest that integrating structured reflective practice into clinical activities can prevent this decline, with digital tools playing a crucial role in sustaining empathy development. Epstein[29] emphasised the importance of teaching future physicians to be mindful of every moment in their practice. This study further explores the combination of present-moment mindfulness and reflection on experiences, which helps doctors make better decisions. Constant self-analysis enables students to approach patient care more informatively, developing a physician's mindset, enhancing decision-making in

complex cases, and increasing resilience to stress. Research shows that medical students' ability to analyse their work shifts dramatically during crises. Technology ensures learning continuity even in challenging circumstances. Virtual simulators and online platforms provide opportunities to practise complex cases repeatedly without jeopardising patient health. Drigas and Papoutsi[30] also confirmed how digital tools aid students in analysing their experiences, creating learning situations as close to real-life practice as possible.

Thus, comprehensive analysis of current research indicates significant progress in recognising the importance of reflective practice in developing professional skills. The integration of digital technologies and a focus on emotional intelligence create a synergistic effect in education. Regular reflection promotes clinical thinking, professional empathy, and stress resistance, broadening the understanding of professional identity formation and offering new opportunities to enhance medical education. However, balancing technological innovations with the human aspect of medical education is crucial, with reflective practice bridging theoretical knowledge, practical skills, and professional growth.

Conclusions

The integration of digital technologies in medical education has significantly enhanced reflective practices, providing a continuous and personalised learning environment. Platforms and AI systems enable the development of critical professional skills by combining traditional teaching methods with innovative approaches. Tools like electronic portfolios, automatic reflection analysis, and virtual clinical simulations support individualised professional growth. Emotional intelligence and mindfulness play crucial roles in students' professional development, helping them to analyse experiences, cope with stress, and make informed clinical decisions. Reflective practices like diaries, group discussions, and case analyses foster a deep understanding of medical practice, which is essential for professional adaptation in high-stress medical environments. To improve reflective practices, a unified digital ecosystem is needed, integrating professional development tools, group reflection sessions, and AI-based analysis. This system can provide personalised feedback to enhance clinical thinking. Additionally, educators must continuously develop their reflective learning facilitation skills.

Effective reflective practices require a systematic approach, with foundational skills developed early in training and clinical case analysis emphasised in later stages. A balance between technology and live interaction ensures that digital tools complement traditional methods, creating a synergistic educational experience. However, further empirical research on AI's role in personalised learning and the impact of group reflection on clinical reasoning is needed.

Ethical statement

I confirm that all the research meets ethical guidelines and adheres to the legal requirements of the study country. A study was approved by the Ethics Commission of Ajman

University, No. 78931. I confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

Author's contribution

A. Spaska: conceptualization, methodology, data curation, writing-original draft preparation, visualisation, investigation, supervision, software, validation, writing-reviewing, and editing.

Conflict of interest

The author declares no conflict of interest.

Data availability

The data that support the findings of this study are available on request from the corresponding author.

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