

Article

How the ITOD Framework Guided the Integration of AI Ethics Teaching into a Medical Humanities Course, and Lessons to Learn

Joshua Oladele Owolabi 

Department of Biomedical Sciences, PCOM South Georgia, Philadelphia College of Osteopathic Medicine, Moultrie, GA 31768, USA; joshuaow@pcom.edu

Abstract

Inner Triangle Outer Diamond (ITOD) Framework, presented and published in 2025, informed and guided the introduction of Artificial Intelligence (AI) ethics education into a Medical Humanities course for medical students. Central to the ITOD Framework is the premise that education takes place in an *ecosystem*, with outcomes shaped by the dynamic interplay and interactions among multiple components. In planning and designing the instruction, the ITOD's inner triangle helped connect pedagogy (team-based learning), curriculum (AI in Medical Humanities), and assessment (reflective practice). The outer diamond's elements were also considered to ensure proper alignment of the educational intervention with programme requirements, with special emphasis on resources, policies, instructional design, curricular structure, standard practices, including the educational ecosystem dynamics, and alignment of outcomes with overall programme objectives. Very importantly, the ITOD also aided in calibrating an effective response to external conceptual factors such as technological and cultural advances, and professional advancements. A pre- and post-intervention survey design was adopted to evaluate the impact of the educational intervention ($n = 113$ pre-session; $n = 103$ post-session). Results showed significant positive shifts in self-reported AI understanding, increased support for formal AI integration into the curriculum, and enhanced confidence in critically engaging with AI outputs (94.1% reporting 'yes' or 'somewhat' post-session). Following the educational intervention and the feedback received from the learners, it is accurate to state that the ITOD was a reliable framework for introducing technology-related topics, specifically Artificial Intelligence ethics education, into Medical Humanities within an undergraduate medical programme. The approach is hereby presented in this work and recommended to educators, academic leaders, and other stakeholders.

Keywords: ITOD Framework; artificial intelligence; medical humanities; medical students; curriculum; pedagogy; assessment; AI ethics; team-based learning



Academic Editor: Branko Aleksic

Received: 6 April 2026

Revised: 15 June 2026

Accepted: 23 June 2026

Published: 26 June 2026

Copyright: © 2026 by the author.

Published by MDPI on behalf of the Academic Society for International Medical Education. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the

[Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

1. Introduction and Review of Literature

This work presents the use of a new framework—the Inner Triangle Outer Diamond (ITOD) Framework—to successfully and strategically integrate artificial intelligence (AI) ethics and use in medical education into the medical school curriculum, with proven impact on learners' knowledge, skills, and behavioural aptitudes. The premise was to strategically introduce and integrate AI education into the medical school curriculum in ways that could assure desirable impacts, and not merely as an add-on. However, no suitable conventional framework was found to be adequate in ensuring proper and strategic implementation with adequate and balanced considerations for the curriculum,

pedagogies and assessments with a learner-centred orientation, in addition to a need to properly consider the roles of leadership, technological orientation, culture of innovation, among other key considerations.

In this instance, the ITOD Framework, which was recently published by the author, provided the much-needed framework and was thereby deployed to support the introduction of AI ethics and use into a medical school curriculum for the first time. The success of this approach and lessons learned constitute the core of this article, and could serve as a reference guide as well as inspiration for other educators and institutions or programs seeking to adopt a culture of innovation in an evidence-based manner, thereby properly introducing and integrating AI education into similar programmes. The ITOD Framework is a learner-centred framework with core triangular considerations that include 1. Curriculum, 2. Pedagogy, and 3. Assessment. The Outer Diamond conditions include 1. Leadership and Administration; 2. Programme and Course Evaluation; 3. EdTech and Innovations; 4. Theories of Learning and Frameworks; 5. Instructional Design, Resource Development and Management; 6. Research and Development.

With the increased use of artificial intelligence (AI) in various walks of life, educators and educational institutions, including medical schools, have devoted significant effort to teaching educators and learners how to use AI for various learning and educational activities [1–3]. The term AI literacy has become increasingly popular in higher and medical education [2]. It is, however, instructive to emphasise that institutions that have adopted the use of AI are typically early adopters, as several other institutions are either resisting AI adoption, seemingly indecisive, or significantly regulating and restricting its use [4,5]. Concerns and fears presented by stakeholders who appear unenthusiastic about AI adoption largely relate to ethics and standards, arguably much more than to technical capabilities [4]. Others that have appeared to adopt AI have focused predominantly on matters of ‘how to’ use AI. The popularity of “how-to” programmes and courses regarding AI adoption is not problematic in itself but remains concerning as it leaves significant gaps regarding AI’s proper integration into medical and higher education ecosystems [6].

It could further be postulated that disproportionate devotion of efforts towards AI mastery and technical competence in AI use, at the expense of proper educational adaptation and systemic assimilation, could lead to significant unintended consequences. Such unintended consequences may lead to the characteristic “trough of disillusionment” in line with the analogy of the Gartner Hype Cycle of technology adoption [7]. Noting that the fallout from misuse and maladaptation of AI could have significant repercussions for institutions, learners, and other stakeholders—with poor practices, negligence of ethical principles, and lack of depth of insight about AI capability and use having far-reaching effects—it is therefore important for there to be a robust framework for properly integrating, adapting, and optimising the use of AI in medical education disciplines or domains [8,9].

At the level of the educational ecosystem, medical schools and higher education institutions, academic leadership and capacity to lead change play critical roles in setting innovative agendas, especially in integrating AI into a medical educational program. To date, there are no widely applicable theories or frameworks provided to guide the integration of AI into educational ecosystems. Recently, the Inner Triangle Outer Diamond (ITOD) Framework was presented and published as a framework for supporting innovations and technologies integration into educational ecosystems [10]. It is to this end that this work presents an effort to not only introduce AI into a medical education programme through the medical humanities curriculum, but also demonstrates the use of a peer-reviewed framework as well as the educational impact and outcomes of this effort. This could serve as not only a reference for other educators but also a useful tool for AI optimisation in the context of medical and higher education. The primary purpose of this article is

to present and describe the process of using the ITOD Framework to guide a successful implementation of an innovative approach to integrating AI ethics and use into a medical humanities curriculum.

2. Materials and Methods

Study Design and Context: This study employed a pre- and post-intervention survey design to evaluate the impact of an educational intervention that integrated AI ethics into a Medical Humanities and Wellness (MH&W) course at an osteopathic medical school in the United States. The primary goal was to document the use of an innovative approach to introduce AI ethics and use into a medical school curriculum with an existing framework serving as a guide for a successful and potentially sustainable impact. The actual intervention was an educational activity on AI use and ethics that follows a hybrid novel method using a team-based learning and reflective practice approach. The intervention was guided by the ITOD Framework [10] and its philosophical underpinning, including the fundamental premise that education takes place in an ecosystem. The subject determined most appropriate for this integration was medical humanities, noting that this was the first time AI would be taught in this medical programme and in the medical humanities course. Institutional Review Board (IRB) approval was obtained to use collected data for research and scholarly activities.

Participants: Participants were first-year osteopathic medical students enrolled in the MH&W course. A total of 113 students completed the pre-session survey, and 103 completed the post-session survey. All students participated in the educational intervention, which was delivered as a two-hour session.

The ITOD Framework as a Guiding Structure: Based on the ITOD Framework [10], proper considerations were given to both the inner triangle elements (curriculum, pedagogy, and assessment) and the outer diamond elements (leadership and administration, programme and course evaluation, educational technology and innovations, theories of learning and frameworks, instructional design and resource development, and research and development) (Figure 1). The flow of activities during the educational intervention was carefully planned (Table 1), and the instructional design, pedagogical approach, and assessment elements were determined with a clear rationale (Table 2).

Flow of Activities: The order of activities included: a welcome and presentation of learning outcomes, opening polls, a pre-intervention questionnaire, a short presentation on AI ethics, article reading, a break, team-based learning (TBL) discussions and reflective practice submission, a debriefing question-and-answer session, a post-intervention questionnaire, and closing (Table 1).

Instructional Content: Recognising that a class of over 100 learners might not necessarily be at the same level of AI use and AI literacy, a short presentation of approximately 15 min about AI was delivered, with emphasis on the work of Jobin et al. [4], listing AI ethics principles to include transparency, privacy, accountability, non-maleficence, and responsibility. The DAPI (Data, Algorithm, Platform, Infrastructure) framework was also introduced to help students identify points at which ethical principles could be compromised in AI systems. Two peer-reviewed articles were selected for group reading: Article 1 focused on ethical debates amidst flawed healthcare AI metrics [11], and Article 2 examined the performance of ChatGPT on the United States Medical Licensing Examination (USMLE) [12]. These articles provided complementary perspectives—one focused on ethical considerations in clinical practice and the other on AI's potential in medical education.

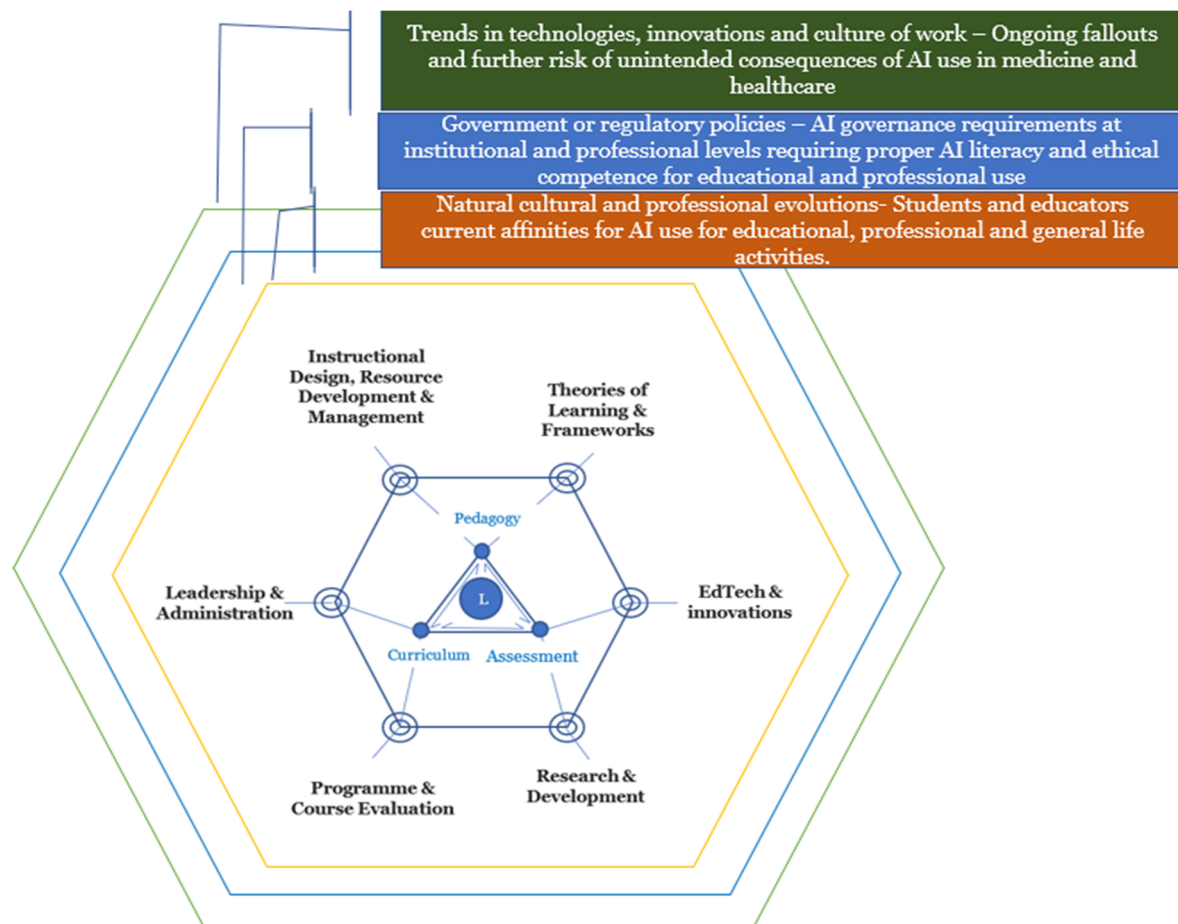


Figure 1. Adaptation of the original ITOD Framework showing ecosystem items that constitute the inner triangle and the outer diamond, highlighting the roles of external influence on the educational ecosystem, thereby necessitating the introduction of AI Ethics into the Medical Humanities curriculum as adapted from a previous publication. ITOD Framework—Inner Triangle Outer Diamond Framework. L—Learner [10].

Table 1. Flow of activities during the educational intervention on AI in medical humanities.

#	Activity	Significance
1	Welcome and Presentation of Learning Outcomes	Sets the stage for the session, presenting the relevance, goals, objectives, and expected outcomes of the educational intervention.
2	Opening Polls	A 2-question poll measuring learners' baseline experience with AI literacy, AI use, and AI ethics in the context of medical education and practice.
3	Pre-Intervention Questionnaire	A pre-intervention survey to measure key attributes of knowledge, skills, and attitudes regarding AI literacy, AI use experience, and AI applications.
4	Presentation on AI Ethics	A short 15 min presentation on AI ethics and its application to medical education and practice, setting the stage for article reading.
5	Article Reading	Reading of two articles collectively by students in TBL groups: Article 1: Gallifant et al. [11]— <i>Ethical debates amidst flawed healthcare AI metrics</i> Article 2: Kung et al. [12]— <i>Performance of ChatGPT on USMLE</i>
6	Break	A rest break encouraging personal reflections and relaxation, in readiness for further discussion.

Table 1. Cont.

#	Activity	Significance
7	TBL Discussions and Reflective Practice Submission	Discussion by students in TBL groups with emphasis on AI literacy, AI use, and AI ethics. Followed by submission using the Experience–Reflection–Action (ERA) reflective cycle model [13].
8	Debriefing Q&A	A facilitated session on further questions, rebuttals, clarifications, and resolution of any conflicting opinions.
9	Post-Intervention Questionnaire	Post-intervention survey matched with the pre-intervention survey to measure changes in selected attributes of knowledge, skills, and attitudes regarding AI.
10	Closing	Final instructions, acknowledgement of performances, and proper session closure.

Table 2. Instructional design, pedagogical approach, and assessment elements with rationale.

#	Key Consideration	Rationale
1	Instructional Design	Adherence to key instructional design principles, such as Universal Design for Learning [14], helped to choose the best instructional approach. Attention was also paid to the PICRAT model [15] by using technology to amplify learners' experiences in TBL and enhancing interactions.
2	Pedagogical Approach	The team-based learning approach followed adult learning principles [16], provided autonomy, and allowed learners to learn as partners alongside educators, noting that the topic is not necessarily built around educator expertise but collective learning and application of core principles.
3	Assessment Elements	Careful analysis of the best approach to assessment led to the choice of reflective practice [13], allowing for reflection in action and reflection on action and learning, reducing pressure from conventional assessments. Assessment was graded as pass/fail on the basis of group submission meeting the threshold set in the instructions.

Data Collection Instruments: Pre- and post-intervention questionnaires were administered via Google Forms. The pre-session survey (n = 113) included 12 items measuring: self-rated AI understanding, frequency of AI tool use, most pressing ethical concerns, concerns about AI in patient care, support for formal AI integration into the curriculum, confidence in evaluating AI outputs, understanding of DAPI components, perceived urgency of AI integration, self-rated AI competence, anxiety about AI's potential abuse of human rights, perceived most useful role of AI in medical education, and one open-ended question about concerns to be addressed. The post-session survey (n = 103) included matched items to evaluate shifts in these baseline attributes, along with additional items about the session's impact on understanding of ethical challenges and the most surprising insights learned.

Data Analysis: Quantitative data from the pre- and post-session surveys were analysed descriptively using frequencies and percentages. Qualitative data from open-ended responses were analysed thematically. Group reflective submissions (n = 15 groups) were analysed using the ERA (Experience–Reflection–Action) model [13], and emerging themes were identified.

3. Results

The topic contributed to the overall success of the course; students met assessment criteria and received satisfactory grades. The session reported a 100% pass rate, graded based on pass/fail criteria, as all groups completed their activities and submitted their reflections within the time given. Using a standardised rubric, all submissions met the threshold of a pass grade. Course evaluations also showed that learners were satisfied with

the preparation of the learning materials, facilitation, and the contribution of the experience to their learning. Post-course analysis was favourable to sustaining the topic in the Medical Humanities and Wellness curriculum by course, departmental, and curriculum leadership. The quantitative statistics of the measurable impacts of the educational intervention are presented in a separate report with a focus solely on statistical evidence of impacts.

In summary, the pre-intervention survey ($n = 113$) showed that most students rated their AI understanding as moderate (59%; $n = 66$), identified privacy as the top ethical concern (41%; $n = 45$), and only 30.0% ($n = 34$) supported formal AI curriculum integration, while confidence in evaluating AI outputs was generally low. Post-intervention ($n = 103$) data showed that AI understanding shifted substantially upward, with 52% ($n = 54$) rating it as high and 13% ($n = 13$) very high. Nearly half (49.0%; $n = 50$) reported a more favourable perception of AI in medical education, and support for formal integration rose by 10%. Notably, 55% ($n = 57$) in the post survey considered all AI ethical principles important, against the pre-session dominance of privacy as a single concern. Qualitative findings from the 15 group reflective submissions are presented in the table below (Table 3).

Table 3. Table showing the top themes from the 15 groups' reflective submissions that were obtained in forms of students' group-based reflections, and analysed based on the ERA (Experience–Reflection–Action) model [13].

ERA	Top Themes
1 Experience	AI as an emerging educational tool; performance limitations and variability of AI on medical examinations; bias and equity concerns in healthcare AI; and humanistic gaps in AI's capabilities.
2 Reflection	AI is not a replacement but a supplement; concerns about AI bias and reliability; the need for critical oversight; and the shifting role of learners as “critical consumers” of AI.
3 Action	Integration of AI into study routines; calls for AI literacy and ethics education in formal curricula; monitoring AI's role before clinical deployment; cross-disciplinary collaboration among data scientists, ethicists, educators, and clinicians; supplementary use of AI for learning but verifying the outputs against trusted evidence; and integrating mandatory AI literacy and ethics training into medical education and professional development.

Role of the ITOD Framework: The overall success of the course indicates that the ecosystem components—both the inner triangle and the outer diamond elements [10]—sufficiently contributed to the overall success of the session. Tables 4 and 5 detail how specific inner triangle and outer diamond items of the ITOD Framework were utilised to support the success of AI integration into the medical education ecosystem.

Table 4. Inner triangle items of the ITOD Framework [10] and their utilisation in AI integration. Table presents educators' analysis of the role and impact of the curriculum, pedagogy and assessment within the ITOD's construct that contribute to the educational intervention.

Inner Triangle Item	People Involved	Roles and Activities	Ecosystem Impact and Value
Curriculum	Faculty/Course Director; Chair, Associate Dean	Technical review, approval, and administrative support	Integration of AI ethics into the Medical Humanities curriculum
Pedagogy	Faculty	Determination of pedagogical approach (TBL); instructional design and curation of resources	Validation of the approach to represent the educational intervention as a learning experience
Assessment	Faculty	Determination of assessment approach (reflective practice); development of submission template	Validating immediate educational value and impacts in alignment with learning outcomes

Table 5. Outer diamond items of the ITOD Framework [5] and their utilisation in AI integration. Table presents educators' analysis of the role and impact of the outer diamond elements within the ITOD's construct that contribute to the educational intervention.

Outer Diamond Item	People Involved	Roles and Activities	Ecosystem Impact and Value
Leadership & Administration	Faculty/Course Director; Chair, Associate Dean	Technical review, approval, and administrative support	Acceptance of topic inclusion and suitability of change
Programme & Course Evaluation	Associate Dean	Learner pre- and post-intervention feedback; end of course feedback	Validation of topic relevance, significance, and impacts towards sustainability
EdTech & Innovations	Faculty	Google Forms for surveys; Polls Everywhere for opening polls; LMS for materials	Affordable platforms, ease of use towards technology sustainability
Theories of Learning and Frameworks	Faculty	Adult Learning Theory [16]; TBL; Reflective Practice [13]	Evidence-based educational approach for validation and sustainability
Instructional Design & Resource Management	Faculty	Pre-session plan; resource application and activity map	Evidence of sound institutional approach towards sustainability
Research & Development	Faculty	Data collection; thematic analysis of key themes and significance	Data to provide evidence of impact and educational value towards sustainability

4. Discussion

The educational intervention involving the use of the ITOD Framework [10] to guide the introduction of AI ethics as a Medical Humanities topic in a medical school was demonstrably successful. As indicated in the Methods and Results sections, sessions were successfully held with evidence that educational objectives were met. The quantitative data demonstrate meaningful shifts across multiple domains—from self-reported AI understanding and ethical awareness to support for formal AI integration and critical engagement skills. These findings add to the growing body of evidence that structured educational interventions can meaningfully improve AI literacy among medical students [1–3].

It is also evident that the pedagogical approach, as well as initial curricular considerations, were largely responsible for the successful implementation of an educational intervention that had not been previously conducted in this context. The use of an unconventional assessment approach—in this instance, reflective practice submissions—enriched learners' experience and provided a rich opportunity to test actual learning and analyse areas of strength and aspects that might be considered for further emphasis in future cycles of the session. This represents clear evidence that AI ethics literacy can be taught using active learning approaches, and that reflective practice can also be used as a form of assessment [13,17]. The latter point is instructive, as multiple-choice assessment is the traditional assessment method in medical schools, whereas didactic lectures are also predominantly used for presenting information, especially with emphasis on knowledge transmission.

What this educational intervention has demonstrated, among other things, includes the fact that team-based learning offers an opportunity to robustly discuss topics such as AI—which might be considered unconventional in the medical humanities space—explore the available evidence deeply, and construct new learning that can further reinforce informed positions through enhanced engagement [18]. The notable shift from privacy as the dominant ethical concern pre-session (40.5%) to a more balanced appreciation of all ethical principles post-session (54.9% endorsing all principles as equally important)

suggests that the intervention successfully broadened students' ethical reasoning beyond a single-issue perspective toward a more comprehensive ethical framework.

Applications of the ITOD's Inner Triangle Principles: It is important to consider the applications of the ITOD's Inner Triangle elements and their working principles in the context of this work. Upon determining the appropriateness of teaching AI in the context of medical humanities, the inner triangle elements of the ITOD Framework were properly considered: curriculum, pedagogy, and assessment [10]. Noting that the medical humanities curriculum provides a robust opportunity to teach subjects that complement biomedical science knowledge as well as clinical competencies, AI was considered not only a timely but also an important area of knowledge requirement for medical students and professionals alike [7,19]. Appropriate timing was determined, and a session was scheduled as a two-hour active learning session. As required, the introduction of AI into the medical humanities curriculum received institutional approval.

In terms of the *curriculum*, the session was given an appropriate topic and was scheduled with clear information about the date, time, and space. The curriculum was presented for approval, scheduling was done by the academic officer in charge, and the session leader was clearly identified. Regarding *pedagogy*, the two-hour session was determined, in line with appropriate learning theories, to be an active learning session supported by adult learning theory [16]. A team-based learning approach was adopted for the actual learning activity, whereby students were required to read one of two carefully selected articles focused on the use of AI for educational or medical purposes [11,12]. Concerning *assessment*, the approach was carefully determined to be a reflective practice submission, whereby students, as a group, after reading the article, were required to use the Jasper [13] Experience–Reflection–Action (ERA) model to make a submission regarding their learning experience. In addition, they were also required to formulate an action statement premised on their newly acquired insights regarding AI in medical education and practice.

Applications of the ITOD's Outer Diamond Principles: Leadership and administration played significant roles. This component was arguably the most influential factor in this case. Leadership levels of influence included the Course Director recommending the introduction of AI use into the MH&W course. Evidence in support included a proper evaluation of 'centripetal' influencing forces (trends in technologies, innovations, and culture of work; government or regulatory policies; natural cultural and professional evolutions), analysis of the overall curriculum indicating no current session on AI use and ethics at the time, evidence of an opportune point of AI instruction, an evidence-informed pedagogical approach, and a justification for the choice of assessments. Leadership support also helped address initial systemic resistance, typical of innovative ideas and new curricular topics [20]. With respect to *programme and course evaluation*, the session evaluation, conducted in line with established institutional practice using the Anthology software (3900 series), showed that students found the session on AI use and ethics in medical education to be highly valuable, practical, and relevant to their professional development, with engaging content that deepened their understanding of AI tools and research.

Furthermore, due consideration was given to **EdTech and innovations**: Media was used for instruction; the LMS (Blackboard) helped to present pre-session and in-session materials. Polls Everywhere was used for baseline assessment polls; Google Forms was used to collect pre- and post-intervention data; and Google Document was used by groups to submit their reflections. In the aspect of the *theories of learning and frameworks*, adult learning theory [16] was primarily considered, and its principles were applied to provide learners with autonomy during their TBL activities, to collaborate, and to find purpose in the relevance of the topic to their training and future career [17]. Also considered were

instructional design, resource development, and management. Universal Design for Learning [14] was a key consideration; all platforms and resources used provided equitable possibilities of access. The PICRAT model [15] was considered to ensure that technology was used purposefully to enhance, rather than merely replace, existing instructional practices. Regarding *research and development*, the initial review of evidence available informed the selection of articles. The two articles were selected on the basis of relevance to medical education and practice, providing complementary perspectives—educational and practice-oriented. The session, considered as an educational intervention, also collected pre- and post-exposure data, with IRB approval obtained for further research and scholarly activities. There is evidence from this work that the use of a framework in designing an educational intervention could be a significant predictor of impact success.

Contributions of This Work: This work addresses several critical gaps in the literature. First, it provides a practical demonstration of how a peer-reviewed framework (the ITOD) can be used to systematically guide the integration of a new and emerging topic (AI ethics) into an existing medical curriculum. Second, it demonstrates that AI ethics can be effectively taught within the medical humanities space using active learning and reflective practice, rather than requiring a standalone informatics or technology-focused course. Third, it provides empirical evidence of the educational impact of such an intervention, with quantitative and qualitative data showing meaningful shifts in knowledge, attitudes, and intended behaviours. Fourth, it offers a replicable model for other institutions seeking to integrate AI education into their programmes, supported by a structured framework that considers the full educational ecosystem rather than focusing narrowly on content delivery alone. Finally, this work demonstrates that medical students, when provided with appropriate scaffolding and evidence-based articles, can engage critically and reflectively with AI ethics—a competency increasingly essential for future physicians [1,4,8].

Collectively, these findings underscore the broader imperative for medical schools to move beyond passive instruction toward integrated, ethics-centred AI education [21]. As AI systems become embedded in clinical decision-making and patient care pathways, graduates who lack foundational AI literacy risk both professional unpreparedness and potential patient harm [22]. Longitudinal reinforcement of AI ethics across curricula, rather than single-session exposure, will be necessary to sustain attitudinal change and build durable competencies [23]. The ITOD Framework offers a principled, scalable mechanism to support such longitudinal integration within existing institutional structures [8].

5. Limitations

This study reports a one-time intervention and has not considered the sustained impact of the intervention; therefore, it cannot establish long-term retention of impact. This work emphasises the use of a relatively new framework to guide an innovative approach to integrating an emerging, albeit critically important subject into an existing curriculum; its goal was not to generate data to validate the framework for every context. The latter shall be a subject of continuous research. The study and reported immediate impacts are also limited to a single institution; other institutions can model this, but multi-institutional data would be required to further strengthen evidence as presented in this initial intervention. Consequently, future longitudinal follow-up, multi-centre implementation, and objective assessment of AI ethics competencies would be helpful.

6. Conclusions

The ITOD Framework provided a reliable and comprehensive structure for introducing AI ethics education into a Medical Humanities course within an undergraduate medical programme. The framework's inner triangle elements (curriculum, pedagogy, and

assessment) and outer diamond elements (leadership, evaluation, educational technology, learning theories, instructional design, and research) collectively ensured that the educational intervention was properly conceptualised, implemented, and evaluated within the broader educational ecosystem. The use of the ITOD framework proved to be successful in guiding an innovative approach to introducing AI ethics and awareness into a medical school curriculum. This approach is hereby recommended to educators, academic leaders, and other stakeholders seeking to responsibly integrate AI education into medical and health sciences programmes.

Funding: This research received no external funding.

Institutional Review Board Statement: Proposal was reviewed and approved by the Philadelphia College of Osteopathic Medicine Institutional Review Board; Protocol #H25-051.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: This work has no additional data not reported in the current version. Any further specific requests can be made to the corresponding author.

Conflicts of Interest: The author declares no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

ITOD	Inner Triangle Outer Diamond
MH&W	Medical Humanities and Wellness
ERA	Experience–Reflection–Action
IRB	Institutional Review Board
AI	Artificial Intelligence
PICRAT	Passive, Interactive, Creative and Replacement, Amplification, Transformation

References

1. Gordon, M.; Daniel, M.; Ajiboye, A.; Uraiby, H.; Xu, N.Y.; Bartlett, R.; Hanson, J.; Haas, M.; Spadafore, M.; Grafton-Clarke, C.; et al. A scoping review of artificial intelligence in medical education: BEME Guide No 84. *Med. Teach.* **2024**, *46*, 446–470. [[CrossRef](#)] [[PubMed](#)]
2. Simoni, J.; Urtubia-Fernandez, J.; Mengual, E.; Simoni, D.A.; Royo, M.; Egaña-Yin, D.; Hertog, O.L.; López-Ortiz, L.; Muñoz-Tomás, A.; Santiago-Martínez, P.; et al. Artificial intelligence in undergraduate medical education: An updated scoping review. *BMC Med. Educ.* **2025**, *25*, 1609. [[CrossRef](#)] [[PubMed](#)]
3. Tozsín, A.; Ucmak, H.; Soyuturk, S.; Aydin, A.; Gozen, A.S.; Fahim, M.A.; Güven, S.; Ahmed, K. The role of artificial intelligence in medical education: A systematic review. *Surg. Innov.* **2024**, *31*, 415–423. [[CrossRef](#)] [[PubMed](#)]
4. Jobin, A.; Ienca, M.; Vayena, E. The global landscape. *Nat. Mach. Intell.* **2019**, *1*, 389–399. [[CrossRef](#)]
5. Masters, K. Artificial intelligence in medical education. *Med. Teach.* **2019**, *41*, 976–980. [[CrossRef](#)] [[PubMed](#)]
6. Civaner, M.M.; Uncu, Y.; Bulut, F.; Chalil, E.G.; Tatli, A. Artificial intelligence in medical education: A cross-sectional needs assessment. *BMC Med. Educ.* **2022**, *22*, 772. [[CrossRef](#)] [[PubMed](#)]
7. Fenn, J.; Raskino, M. *Mastering the Hype Cycle: How to Choose the Right Innovation at the Right Time*; Harvard Business Press: Brighton, MA, USA, 2008.
8. Grunhut, J.; Wyatt, A.T.M.; Marques, O. Educating future physicians in artificial intelligence (AI): An integrative review and proposed changes. *J. Med. Educ. Curric. Dev.* **2021**, *8*, 23821205211036836. [[CrossRef](#)] [[PubMed](#)]
9. Mousavi Baigi, S.F.; Sarbaz, M.; Ghaddaripouri, K.; Ghaddaripouri, M.; Mousavi, A.S.; Kimiafar, K. Attitudes, knowledge, and skills towards artificial intelligence among healthcare students: A systematic review. *Health Sci. Rep.* **2023**, *6*, e1138. [[CrossRef](#)] [[PubMed](#)]
10. Owolabi, J. Presenting the Inner Triangle Outer Diamond (ITOD) Framework of Educational Ecosystems and Its Applications to the Integration of Educational Technologies and Innovations. *Cureus* **2025**, *17*, 99949. [[CrossRef](#)] [[PubMed](#)]
11. Gallifant, J.; Bitterman, D.S.; Celi, L.A.; Gichoya, J.W.; Matos, J.; McCoy, L.G.; Pierce, R.L. Ethical debates amidst flawed healthcare artificial intelligence metrics. *npj Digit. Med.* **2024**, *7*, 243. [[CrossRef](#)] [[PubMed](#)]

12. Kung, T.H.; Cheatham, M.; Medenilla, A.; Sillos, C.; De Leon, L.; Elepaño, C.; Madriaga, M.; Aggabao, R.; Diaz-Candido, G.; Maningo, J.; et al. Performance of ChatGPT on USMLE: Potential for AI-assisted medical education using large language models. *PLoS Digit. Health* **2023**, *2*, e0000198. [CrossRef] [PubMed]
13. Jasper, M. *Beginning Reflective Practice*; Cengage Learning: Hampshire, UK, 2013.
14. CAST. Universal Design for Learning Guidelines Version 2.2. Available online: <https://udlguidelines.cast.org/> (accessed on 22 June 2026).
15. Kimmons, R.; Graham, C.R.; West, R.E. The PICRAT model for technology integration in teacher preparation. *Contemp. Issues Technol. Teach. Educ.* **2020**, *20*, 176–198.
16. Knowles, M.S.; Holton, E.F., III; Swanson, R.A. *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*; Routledge: New York, NY, USA, 2025.
17. Taylor, D.C.; Hamdy, H. Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. *Med. Teach.* **2013**, *35*, 1561–1572. [CrossRef] [PubMed]
18. Parmelee, D.; Michaelsen, L.K.; Cook, S.; Hudes, P.D. Team-based learning: A practical guide: AMEE Guide No. 65. *Med. Teach.* **2012**, *34*, e275–e287. [CrossRef] [PubMed]
19. Tolentino, R.; Baradaran, A.; Gore, G.; Pluye, P.; Abbasgholizadeh-Rahimi, S. Curriculum frameworks and educational programs in AI for medical students, residents, and practicing physicians: Scoping review. *JMIR Med. Educ.* **2024**, *10*, e54793. [CrossRef] [PubMed]
20. Bland, C.J.; Starnaman, S.; Wersal, L.; Moorhead-Rosenberg, L.; Zonia, S.; Henry, R. Curricular change in medical schools: How to succeed. *Acad. Med.* **2000**, *75*, 575–594. [CrossRef] [PubMed]
21. Ng, D.T.K.; Leung, J.K.L.; Chu, S.K.W.; Qiao, M.S. Conceptualizing AI literacy: An exploratory review. *Comput. Educ. Artif. Intell.* **2021**, *2*, 100041. [CrossRef]
22. Paranjape, K.; Schinkel, M.; Panday, R.N.; Car, J.; Nanayakkara, P. Introducing artificial intelligence training in medical education. *JMIR Med. Educ.* **2019**, *5*, e16048. [CrossRef] [PubMed]
23. Char, D.S.; Shah, N.H.; Magnus, D. Implementing machine learning in health care—Addressing ethical challenges. *N. Engl. J. Med.* **2018**, *378*, 981–983. [CrossRef] [PubMed]

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.