Open Journal of Applied Sciences, 2026, 16(8), 2774-2787
https://www.scirp.org/journal/ojapps
ISSN Online: 2165-3925
ISSN Print: 2165-3917

Research Progress and Trends of AI-Empowered Medical Imaging Teaching in the Context of New Medical Science

Qun Yang*, **Nan Chen**, **Yun He#**

Health Science Center, Yangtze University, Jingzhou, China
Email: yangqun516021@yangtzeu.edu.cn, #mrheyun@yangtzeu.edu.cn

How to cite this paper: Yang, Q., Chen, N. and He, Y. (2026) Research Progress and Trends of AI-Empowered Medical Imaging Teaching in the Context of New Medical Science. *Open Journal of Applied Sciences*, **16**, 2774-2787.
https://doi.org/10.4236/ojapps.2026.168155

Received: July 8, 2026
Accepted: August 23, 2026
Published: August 26, 2026

Abstract

The rapid advancement of artificial intelligence (AI) is driving a profound paradigm shift in medical imaging education. As a discipline bridging theoretical knowledge, practical skills, and clinical application, medical imaging faces multiple challenges in the intelligent era, including insufficient teaching resources and difficulties in cultivating clinical reasoning. This paper, using a narrative review approach, systematically examines the theoretical underpinnings of AI-empowered medical imaging teaching—Outcome-Based Education (OBE), constructivism, Tyler's Objective Model, and human-machine collaborative teaching theory—and synthesises the integration of AI across three dimensions: pedagogical reconstruction, personalised evaluation, and image-reading training. It further analyses key constraints such as insufficient algorithmic interpretability, content reliability risks, faculty competency gaps, and ethical deficiencies. On this basis, it proposes development pathways, including building human-machine collaborative teaching ecosystems, strengthening AI ethics education, establishing evidence-based evaluation systems, and deepening industry-education integration. The review finds that AI-driven teaching models hold promise for bridging theoretical instruction and clinical practice, and for supporting the cultivation of versatile medical imaging talents in the intelligent era. However, the current evidence is mostly derived from single-centre, small-sample studies lacking effect sizes and long-term follow-up, and many proposed strategies remain to be validated.

*First author.
#Corresponding author.

Keywords

Artificial Intelligence, Medical Imaging Teaching, Teaching Reform, Human-Machine Collaboration, Smart Classroom

1. Introduction

The iterative maturation of AI technologies in medical image recognition, computer-assisted diagnosis, and intelligent image analysis has injected new momentum into modern medicine [1]. Medical imaging, as a core discipline that combines theoretical knowledge, practical skills, and clinical applicability, relies heavily on image observation, logical reasoning, and accumulation of clinical experience. Traditional teaching models have become inadequate for meeting the talent cultivation demands of the intelligent era. "New Medical Science" is defined here as a strategic framework that, oriented towards life health, technological innovation, and medical model transformation, features interdisciplinary integration (medicine-engineering-science-humanities) and aims to reshape medical education and talent development systems. At the national policy level, China has issued the New Generation Artificial Intelligence Development Plan and the Opinions on Deeply Implementing the "AI+" Action, which designate intelligent healthcare and AI-assisted imaging diagnosis as development priorities, thus establishing a policy foundation for clinical translation and associated talent cultivation. Against this backdrop, AI has progressively permeated medical education systems, serving not only as an efficient teaching aid but also possessing the potential to integrate teaching resources, reshape teacher-student interaction models, and enrich students' knowledge construction pathways, thereby driving systematic transformation of traditional teaching philosophies and models [2] [3].

2. Theoretical Foundations of AI in Medical Imaging Teaching

The deep integration of AI and medical imaging teaching is a systematic innovation supported by educational theories, cognitive learning theories, and collaborative education theories. These provide the necessary academic foundations for the scientific design, standardised implementation, and precise evaluation of smart imaging education.

2.1. Outcome-Based Education (OBE) Philosophy

OBE provides the fundamental direction for AI-empowered imaging teaching. Wang and Zhang [4] systematically reviewed its application in clinical practice teaching, confirming its effectiveness. Tu *et al.* [5] demonstrated that AI systems can dynamically deliver adaptive learning resources based on students' expected outcomes through a backward design approach, aligning with OBE logic. Liu *et al.* [6] further confirmed that AI-assisted medical imaging experimental teaching facilitates students' transition from passive reception to active inquiry. Ran *et al.* [7] conducted a randomised controlled trial targeting CTPA diagnosis teaching of pulmonary embolism, constructing an AI-OBE integrated teaching system. By backward-deconstructing teaching objectives oriented toward clinical competency and combining this with an AI intelligent image-reading platform for tiered case-based training, they showed that this model simultaneously improved theoretical scores, practical image interpretation capabilities, and clinical diagnostic thinking. These findings indicate that integrating OBE into AI-empowered imaging teaching design—backward-constructing content and evaluation around core objectives such as imaging diagnostic ability, clinical thinking, and AI tool application skills—possesses solid theoretical and practical support.

2.2. Constructivism Learning Theory

Constructivism provides the cognitive psychological foundation for AI-empowered immersive teaching. This theory posits that learning is an active process of knowledge construction within specific contexts, rather than passive reception of external information [8]. AI technology, through virtual simulation, real clinical case reproduction, and 3D dynamic demonstrations, can create highly realistic clinical image-reading scenarios. Wang [9] used constructivism to build an integrated "structure-function-disease" digital experimental teaching system for medical morphology, facilitating a shift from passive indoctrination to active inquiry. Research on knowledge graph-based smart medical imaging courses further confirmed that, under constructivist guidance, AI-supported smart courses increased students' learning interest [10]. These practices demonstrate that immersive clinical scenarios created by AI can guide students to actively construct and internalise knowledge through proactive observation, sign recognition, and logical reasoning, thereby significantly improving the depth of understanding and transfer ability.

2.3. Tyler's Objective Model

Tyler's Objective Model provides a methodological framework for intelligent teaching evaluation. Centred on three core elements—clear objectives, systematic organisation, and quantifiable effectiveness testing—it has been widely applied in digital medical course design [11] [12]. Li *et al.* [13] built a "five-library" teaching platform system based on PACS and big data, achieving a true, objective, and scientific evaluation of teaching effectiveness through multi-method assessment. Zeng *et al.* [14] further introduced real clinical cases into the smart classroom, establishing a diversified evaluation system covering the whole pre-class, in-class, and post-class process. Although these studies do not explicitly name Tyler's model, their design concepts—layered deconstruction of competency objectives, integrated online-offline workflows, and learning analytics for quantitative assessment—are intrinsically consistent with Tyler's framework, and can serve as references for constructing smart classrooms and integrated intelligent evaluation systems.

2.4. Human-Machine Collaborative Teaching Theory

This theory clarifies the rational division of labour between human teachers and technology in intelligent teaching scenarios. Huang *et al.* [15] pointed out that human teachers possess irreplaceable advantages in emotional support, value guidance, and creative thinking cultivation, while AI excels in data processing, pattern recognition, and personalised recommendation; the two should form a complementary, synergistic new teaching ecology. Qin, Hu and Zhang [16] further proposed that intelligent teaching environments require teachers to transform from unidirectional knowledge transmitters into learning designers and mediators of human-machine dialogue. International research in radiology education has indicated that AI should serve only as an auxiliary teaching tool for image quantification and basic case training, while teachers must lead clinical reasoning and critical thinking education regarding algorithmic risks, to prevent students from forming unilateral dependence on intelligent tools [17] [18]. This theory provides a solid academic foundation for defining the role allocation: "AI as an auxiliary diagnostic tool, teachers leading thinking development".

2.5. Linking Theoretical Frameworks to Application Dimensions

The four theories are not isolated; they mutually complement each other and jointly support the three application dimensions of AI-empowered imaging teaching. Specifically, OBE guides backward design and tiered training strategies, serving personalised evaluation and pedagogical reconstruction; constructivism emphasises contextualised learning, supporting image-reading training through virtual simulation and case-based immersion; Tyler's model provides a quantifiable effectiveness framework, underpinning the data-driven implementation of personalised evaluation; and human-machine collaborative theory ensures rational role allocation between teachers and AI in pedagogical reconstruction. Thus, theory, technology, and application form a coherent logic, laying the foundation for subsequent practical analysis.

3. Application Value of AI in Medical Imaging Teaching

3.1. AI-Empowered Teaching Reconstruction and Model Innovation

The introduction of AI is driving systematic transformation from traditional models toward intelligent and personalised directions. Innovative methods such as flipped classrooms and project-based learning are being integrated into teaching practice. Zeng *et al.* [14] constructed a hybrid teaching model ("online self-directed learning + offline flipped classroom with real clinical scenarios") for 96 eight-year traditional Chinese medicine students at Nanjing University of Chinese Medicine. The online component used the Chaoxing Xuexitong platform; teachers used AI to analyse online test and learning activity data to precisely identify knowledge weaknesses and adjust strategies. The offline component introduced the affiliated hospital's PACS system into smart classrooms, dynamically presenting CT/MRI 3D sectional images and employing AI and VR to recreate authentic clinical scenarios. Results showed that the experimental group had significantly higher theoretical scores (86.3 ± 5.2 vs. 79.1 ± 6.4, $p < 0.01$) and practical skill scores. Li and Sun [19] built a smart classroom system covering pre-class preparation, cloud-based instruction, virtual simulation, and digital case libraries, breaking spatial-temporal constraints and transforming lectures into a blended model combining pre-class self-study and group case discussions. Li *et al.* [13] established five AI-driven digital resource libraries based on PACS imaging big data (classic cases, diagnostic errors, research innovation, medical-engineering integration, intelligent assessment), creating a new virtual-blended model with offline large-group lectures, small-group seminar internships, and online mobile self-learning. Xu *et al.* [20] developed a ChatGPT-based intelligent imaging-assisted teaching tool encompassing an intelligent imaging teaching library (typical signs, error-prone cases, dynamic training), intelligent interactive teaching, virtual training, and learning visualisation modules, forming a complete teaching loop of competency assessment, tiered training, dynamic regulation, immediate feedback, and intensive training.

In summary, AI-empowered teaching reconstruction has evolved from the application of a single technological tool to a systematic model innovation encompassing online platforms, offline scenarios, digital resource libraries, and intelligent interactive tools, effectively breaking the spatial and temporal constraints of traditional teaching and driving the transformation of medical imaging teaching from "uniform instruction" to "differentiated empowerment".

3.2. AI-Empowered Personalized Teaching and Precise Evaluation

Personalized teaching and precise evaluation are key dimensions of the intelligent transformation of medical imaging teaching. AI can dynamically adjust teaching content according to students' learning progress and competency levels, providing differentiated learning pathways, while simultaneously collecting and analyzing learning behavior data in real time to support teachers in optimizing teaching strategies. Hong *et al.* [21] demonstrated through a controlled teaching experiment that ChatGPT can be effectively implemented in personalized teaching and full-process precision evaluation systems in medical imaging teaching—students can receive immediate feedback at any time, and the AI system continuously tracks learning behaviors to form dynamic learning profiles. The study also found that ChatGPT can rapidly provide the latest teaching resources, significantly reducing teachers' repetitive lesson-preparation burden. Liu *et al.* [22] integrated an AI imaging diagnostic system with the Chaoxing Xuexitong platform to enable tiered case provision and lesion auto-annotation error correction, incorporating process data tracking, theoretical examinations, and case-based practical assessments. The experimental results showed that students' theoretical scores, practical scores, and satisfaction indicators all improved significantly. Zeng *et al.* [14] further revealed the mechanism of AI-driven personalized teaching: teachers accurately predict teaching difficulties through real-time analysis of learning behavior data, achieving the transformation of instructional decision-making from experience-driven to data-driven. Through the precision teaching loop of learning diagnosis, teaching adjustment, and effectiveness verification, students' personalized learning needs are effectively met. However, all these studies were based on single-course assessments, lacking longitudinal tracking, and the fairness of personalised recommendation algorithms was not evaluated.

3.3. AI-Empowered Imaging Analysis and Image-Reading Training

Image-reading analysis and training constitute the core component of medical imaging teaching and the area with the most concentrated challenges. Traditional reading instruction has long faced three structural dilemmas: insufficient reserve of typical cases; scarcity of teaching resources for detailed feedback; and predominance of static typical images, lacking coverage of rare diseases and dynamic case evolution. AI intervention brings new vitality [23].

At the teaching assistance level, Cai and Chen [24] showed that AI can automatically parse imaging data, assisting students in rapid lesion localisation and precise marking, and deepening understanding through comparison with AI outputs. Hu *et al.* [25] noted that AI in image reconstruction and segmentation helps students more quickly understand complex anatomical structures. At the training platform level, Cui *et al.* [26] systematically elucidated the multiple auxiliary roles of AI virtual simulation platforms in automatically completing lesion delineation, sign quantification, and report correction, supporting tiered training—weaker students can start with typical signs, advanced students can challenge complex cases and differential diagnosis. At the effectiveness validation level, Zhang *et al.* [27] found that interns' detection rate of pulmonary nodules under AI assistance was significantly higher than independent reading (from 78% to 93%, $p < 0.01$), with significantly reduced reading time (from 4.2 to 2.8 minutes per case). Fan *et al.* [28] further confirmed that AI assistance yielded more pronounced benefits for junior residents, suggesting unique value in shortening the learning curve for beginners. In summary, AI reshapes image-reading training from three levels: resource, approach, and effectiveness. However, most conclusions derive from single-disease, single-centre studies, and generalisability awaits verification.

4. Key Challenges of AI-Empowered Medical Imaging Teaching

4.1. Technical Bottlenecks: Insufficient Algorithmic Interpretability and Data Bias

Most AI systems currently applied in imaging teaching are built upon deep neural networks and exhibit typical "black box" characteristics—they can output results but cannot present their internal decision-making logic. This interpretability deficiency creates a dual dilemma in the teaching environment: students struggle to comprehend the diagnostic logic behind AI judgments, diminishing the pedagogical value of the tool, while the incomprehensibility of algorithms undermines trust in intelligent systems, constraining the deep implementation of human-machine collaborative teaching [29]. Moreover, the training data for existing models are often confined to specific institutions or regions, lacking representativeness in terms of population, equipment, parameters, and disease spectrum. The resulting data bias directly affects generalization performance—when students train on atypical cases or rare diseases, AI recognition accuracy may significantly decline, failing to meet the requirements of diverse and comprehensive teaching [29].

4.2. Teaching Risks: Content Reliability and Over-Reliance

Currie *et al.* [18] pointed out that while large language models such as ChatGPT offer value in personalized learning assistance and clinical reasoning training, the accuracy risks of their generated content (the "hallucination" problem) are particularly concerning in medical education—once erroneous knowledge is accepted by students, it may create lasting cognitive biases. Simultaneously, the rapid diagnostic capabilities of AI may cause students to weaken their active analytical and differential diagnostic abilities. Studies have indicated that students who use AI assistance over extended periods experience a decline of approximately 15% in independent diagnostic accuracy [30]. If this "intelligent crutch" effect continues to accumulate, it will progressively erode students' ability to actively observe imaging details, think independently, and reason autonomously, deviating from the core objective of imaging teaching—cultivating autonomous clinical thinking.

4.3. Resource Constraints: Platform Development Threshold and Faculty Competency Gaps

The construction of intelligent imaging teaching systems relies on sustained investment in AI platforms, virtual simulation systems, and structured case libraries. High construction costs and maintenance requirements pose substantial barriers for most regional institutions. Li *et al.* [29] reported that only 12% of faculty radiologists and 3% of residents were familiar with AI implementation in radiology education, and respondents generally expressed concerns regarding AI feedback accuracy, interactivity, and clinical integration, reflecting a structural disconnect between faculty training and platform development. There is currently a lack of differentiated training systems targeting different age groups and technical proficiency levels, and the maintenance and updating of teaching resources face shortages of both specialised personnel and dedicated funding. The gap between well-resourced eastern institutions and less-resourced central/western institutions in China is particularly pronounced, which may exacerbate educational inequity.

4.4. Ethical Dilemmas: Privacy Protection and Liability Attribution

Medical imaging data carry sensitive patient information and fall under the highest category of privacy protection. Sallam's systematic review [31] explicitly noted that sensitive medical data face security vulnerabilities including insufficient encryption and access control deficiencies during transmission, storage, and sharing. In some institutions, anonymisation of imaging materials for teaching purposes remains incomplete, and AI teaching platforms predominantly deployed in cloud environments, coupled with cross-regional sharing, further amplify technical difficulty and compliance risks of privacy protection. In scenarios combining AI-assisted teaching and clinical diagnosis, liability attribution likewise lacks clear ethical norms and legal definitions—when students form erroneous diagnostic understanding due to AI output deviations, the attribution of responsibility remains undefined [31] [32].

4.5. Regulatory and Standardisation Gaps

There are currently no unified quality standards or certification systems for AI-assisted medical imaging teaching at domestic or international levels. Different institutions use AI platforms with vastly different data sources, algorithm versions, and update frequencies, making cross-institutional comparisons of teaching outcomes difficult. Education authorities have not yet issued relevant guidelines or norms, leaving the design, deployment, and evaluation of AI teaching tools without a common framework, and increasing the uncertainty of teaching risks.

5. Future Development Directions and Strategic Recommendations

5.1. Constructing a Tripartite "AI-Teacher-Student" Collaborative Smart Teaching Ecosystem

The core challenge for imaging teaching in the AI era is how to ensure the autonomous development of students' clinical reasoning capabilities while leveraging efficiency advantages. Huang *et al.* [15] pointed out that teachers are irreplaceable in value guidance and thinking development, while AI's advantages lie in data processing and personalised recommendation—mapped to imaging teaching, AI is suitable for initial lesion screening and quantitative analysis, while teachers should focus on diagnostic logic interpretation and AI bias identification. Qin, Hu and Zhang [16] proposed that teachers should become learning designers and mediators of human-machine dialogue, embodied in imaging teaching by designing "human-AI comparison" sessions where students compare their independent reading results with AI outputs and reflect on their diagnostic logic. Students' capacity for critical use of AI should be incorporated into training objectives, guiding them to develop the standardised workflow of "independent reading first, then verification against AI" [13] [33]. This builds a smart teaching ecosystem centred on cultivating independent clinical imaging diagnostic capability. This recommendation is based on theoretical reasoning and preliminary practice, and awaits large-scale empirical validation.

5.2. Strengthening AI Ethics Education and Cultivating Versatile Talents

The deep integration of AI raises a fundamental question: how to ensure students possess ethical judgment capabilities while imparting intelligent tool application skills. The rapid development of generative AI (e.g., GPT-4, Claude 3, Gemini) and multimodal foundation models (e.g., GPT-4V, Med-PaLM 2) brings new opportunities—they can generate simulated cases, explain imaging signs, provide differential diagnosis discussions, and even participate in multi-modal clinical reasoning training. However, these models also carry risks of hallucination, bias amplification, and data privacy issues, and their training data are mostly public resources lacking specialisation in imaging. Therefore, the educational framework must adapt. At the content level, AI ethical norms, data privacy protection, and algorithmic bias recognition should be systematically integrated into the curriculum. Zhang *et al.* [32] pointed out that constructing an educational framework covering these issues is an important foundation for collaborative governance of AI-empowered medical education, and Crotty *et al.* [17] similarly recommended incorporating AI literacy and risk identification into core undergraduate imaging curricula. At the curriculum structure level, an interdisciplinary modular course cluster integrating "medical imaging, data science, artificial intelligence, and ethics/law" should be established to strengthen students' four-dimensional core competencies: clinical imaging diagnostic judgment, standardised operation and critical evaluation of AI tools, awareness of algorithmic risks, and ability to implement medical data ethics and regulations. Currently, only a few institutions have piloted such courses; their effectiveness needs testing, but this is a clear direction.

5.3. Establishing a Scientific Teaching Effectiveness Evaluation System and Continuous Improvement Mechanism

The effectiveness of AI-collaborative teaching requires verification through a scientific evaluation system [32]. A multidimensional evaluation indicator system should be constructed covering theoretical knowledge, practical skills, clinical thinking, autonomous learning, AI application competency, and professional value identification. Concurrently, large-sample, multi-center, long-term controlled studies should be actively promoted to systematically track the long-term impact of AI teaching on students' clinical competency development [29]. Only by constructing a complete closed loop characterized by "quantifiable indicators, traceable processes, and verifiable outcomes" can the evidence base for the promotion and application of smart teaching models be consolidated.

5.4. Deepening Industry-Education Integration and Cross-Institutional Collaboration

Alleviating the shortage of AI teaching resources requires coordinated advancement at three levels: industry-education integration, cross-institutional collaboration, and medical-educational integration. At the industry-education level, university-industry cooperation should be strengthened, connecting AI technology companies and medical education institutions to jointly develop intelligent platforms and tools adapted to imaging teaching scenarios, especially vertical applications based on domestic large language models and multimodal foundation models. At the cross-institutional level, resource-sharing platforms should be established to enable mutual utilisation of case libraries, teaching materials, training projects, and faculty training systems, narrowing the digital teaching gaps between institutions. At the medical-educational integration level, the routine integration of frontline clinical diagnostic data into classroom teaching should be promoted—Zeng *et al.* [14] created a real case resource library based on PACS, bringing clinical reading scenarios into the classroom; Li *et al.* [13] established five digital resource libraries based on PACS imaging big data, creating an integrated clinical, imaging, and pathological teaching chain, providing practical examples for deep integration. These strategies have been preliminarily explored but require policy guidance and funding support.

6. Conclusions

AI-empowered medical imaging teaching is both an inevitable trend in educational digital transformation and New Medical Science construction, and a core pathway for overcoming traditional teaching bottlenecks and enhancing talent cultivation quality. The integration of AI and imaging teaching has progressed from conceptual validation toward larger-scale implementation, demonstrating increasingly clear value in optimising teaching environments, enhancing efficacy, promoting clinical thinking, and facilitating teacher role transformation. The novelty of this review lies in: 1) systematically integrating four educational theories—Outcome-Based Education, constructivism, Tyler's Objective Model, and human-machine collaborative teaching—and establishing clear logical links from theoretical foundations to the three practical application dimensions (pedagogical reconstruction, personalised evaluation, and image-reading training); 2) comprehensively analysing the multifaceted challenges in AI-empowered medical imaging teaching, including technical interpretability, teaching risks, resource constraints, ethical dilemmas, and regulatory gaps, while further identifying the current evidence base as predominantly derived from single-centre, small-sample studies lacking reported effect sizes and long-term follow-up, thereby clarifying the critical knowledge gaps that future research must address. Nevertheless, AI imaging teaching still faces challenges in technical interpretability, teaching risks, resource constraints, ethical norms, and regulatory gaps, with overall development still in a transitional phase from exploration to maturity. Technology is ultimately a means to achieve educational objectives, not an end in itself. In advancing intelligent teaching reform, the cultivation of clinical thinking and medical humanism must always remain at the core, carefully balancing the relationship between technological innovation and pedagogical principles. As AI technology continues to evolve and institutional systems progressively improve, medical imaging teaching is expected to evolve from the initial stage of AI assistance toward a comprehensive, personalised, standardised, and sustainable form of smart education, ultimately providing the healthcare system with a greater number of versatile imaging professionals who possess both sophisticated technical skills, independent thinking capabilities, and humanistic values.

Future research priorities should include: 1) conducting multi-centre randomised controlled trials with reported effect sizes and confidence intervals; 2) establishing long-term cohort studies to assess sustained impact on clinical competency; 3) developing explainable AI technologies suitable for educational contexts; and 4) formulating quality standards and ethical guidelines for AI-assisted imaging teaching.

Funding

This work was supported by Yangtze University's Key Project for Teaching Reform Research (No. JY2025012); Yangtze University 2025 College Students Innovation and Entrepreneurship Training Program Project (No. Yz2025353); Hubei Provincial Natural Science Foundation's Innovation and Development Joint Fund (2026AFC0582); Jingzhou Science and Technology Program (2025HD49). The funders had no involvement in the study design, manuscript writing and the decision to submit the manuscript for publication.

Statement on AI Use

The authors declared that during the preparation of this manuscript, they used DeepSeek, a large language model developed by DeepSeek Company, for language polishing purposes, including but not limited to grammar correction, terminology standardization, and improvement of textual fluency. All AI-generated content has been strictly reviewed and proofread by the authors, who take full responsibility for all viewpoints, data, and final expressions presented in this manuscript.

Author Contributions

YQ designed and supervised the study, CN reviewed the references, YQ wrote the manuscript, HY revised the manuscript, YQ and HY acquired funding. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Liu, S.Y. (2021) Trends and Challenges of Artificial Intelligence in Medical Imaging. *Chinese Journal of Radiology*, **55**, 700-702. (In Chinese)
https://kns.cnki.net/kcms2/article/abstract?v=GB7hzhCfPWg5Vl2KNigJJa-qxFq7OtN6z69i58pVIho1ba7RNfSqoPnpVdPfrteG4efmcX2N3gvHMZvM-SCOS0RxbbgC2IkF8FfhleX-eTS-ngzuVQ7Yevza5ZPFjBmVPwVULMuntQUJBnTczwZEHQna-WSZXTWGu&uniplatform=NZKPT

[2] Bao, L., Miao, Z., Bian, L.F., *et al.* (2025) Application of Artificial Intelligence in Medical Imaging Teaching. *Journal of Jilin University* (*Information Science Edition*), **43**, 412-421. (In Chinese)

[3] Gowda, V., Jordan, S.G. and Awan, O.A. (2022) Artificial Intelligence in Radiology Education: A Longitudinal Approach. *Academic Radiology*, **29**, 788-790. https://doi.org/10.1016/j.acra.2021.08.022

[4] Wang, L. and Zhang, X.Y. (2023) Research Progress on Application of Outcome Based Education Concept in Clinical Practice Teaching. *Chinese Journal of Medical Education Exploration*, **22**, 1863-1868. (In Chinese) https://kns.cnki.net/kcms2/article/abstract?v=GB7hzhCfP-WivBYqFw0hT5IwGWG59fFMRD2H6JPHV7mRaMhTbJclk3GCZF-GazMPs_7yYGsDgsl9nwJKElGE2BznSHPqncH4bHahHioTzUZR-eNpbAcD944pnRp4nO_XQ5t8G3KSeiS3CST-frdNyqGQoARhz30M1d&uniplatform=NZKPT

[5] Tu, Y., Chen, J. and Huang, C. (2025) Empowering Personalized Learning with Generative Artificial Intelligence: Mechanisms, Challenges and Pathways. *Frontiers of Digital Education*, **2**, Article No. 19. https://doi.org/10.1007/s44366-025-0056-9

[6] Liu, Y.H., Liu, T.L., Zhang, Q.H., *et al.* (2025) Exploration on the Application of Artificial Intelligence in Medical Imaging Experimental Teaching. *Western China Quality Education*, **11**, 150-154. (In Chinese)

[7] Ran, J., Wen, F., Mou, C.W., *et al.* (2026) Application and Empirical Study of AI OBE Integrated Teaching Model in CTPA Diagnosis Teaching of Pulmonary Embolism. *Chongqing Medicine*, **55**, 477-480. (In Chinese)

[8] He, K.K. (1997) Constructivism-The Theoretical Basis for Reforming Traditional Teaching (Part 1). *E Education Research*, **3**, 3-9. (In Chinese)

[9] Wang, M. (2025) Digital Demonstration of Integrated Experiments in Medical Morphology Based on DHNote. Lanzhou University Experimental Technology Innovation Fund Project Report. (In Chinese) https://mp.weixin.qq.com/s?__biz=Mzg2NDMxODc1NA==&mid=2247491183&idx=1&sn=10a0cd40c027066d3e37d71de0daec45&poc_token=HKJocGqjF8bpKi5I7e4EGeAULWia_XZq3XfvTY8w

[10] Long, J.F., Dong, P., Yu, M., *et al.* (2025) Construction and Interactive Evaluation of Smart Course of Medical Imaging Based on Knowledge Graph. Conference Paper Abstract. (In Chinese)

[11] Tyler, R.W. (1994) Basic Principles of Curriculum and Instruction (Shi, L.F. Trans.). People's Education Press. (In Chinese) https://vufind.library.sh.cn/Record/b5d6de7d-e1e9-476f-af7d-12d6d6cecfac/Holdings#tabnav

[12] Deng, H. (2024) Evaluation and Enlightenment of Tyler's Classic Curriculum Development Model. *Advances in Education*, **14**, 969-974. (In Chinese) https://doi.org/10.12677/ae.2024.1461033

[13] Li, Q., Ma, L.Y., Xu, A.H., *et al.* (2025) Application and Exploration of Artificial Intelligence in Medical Imaging Teaching under the New Era of Big Data. *China Health Industry*, **22**, 226-229. (In Chinese)

[14] Zeng, L., He, X.J., Wang, Q.H., *et al.* (2025) Practical Research on the Online and Offline Hybrid Teaching Model of Medical Imaging with Artificial Intelligence Empowerment. *Chinese Journal of Clinical Research*, **38**, 70-75. (In Chinese)

[15] Huang, R.H., Liu, D.J., *et al.* (2023) Human-Machine Collaborative Teaching: Path-

way Design Based on Scenarios of Avatars, Digital Twins and Educational Robots. *Open Education Research*, **29**, 4-11. (In Chinese)

[16] Qin, D., Hu, Y.L. and Zhang, L.X. (2020) Teacher Role Reconstruction in Human-Machine Collaborative Teaching. *E-Education Research*, **41**, 13-19. (In Chinese)

[17] Crotty, E., Singh, A., Neligan, N., Chamunyonga, C. and Edwards, C. (2024) Artificial Intelligence in Medical Imaging Education: Recommendations for Undergraduate Curriculum Development. *Radiography*, **30**, 67-73. https://doi.org/10.1016/j.radi.2024.10.008

[18] Currie, G., Singh, C., Nelson, T., Nabasenja, C., Al-Hayek, Y. and Spuur, K. (2023) ChatGPT in Medical Imaging Higher Education. *Radiography*, **29**, 792-799. https://doi.org/10.1016/j.radi.2023.05.011

[19] Li, S. and Sun, C. (2025) Research on the Application Effect of Smart Classroom in Medical Imaging Internship Teaching. *China Continuing Medical Education*, **17**, 125-129. (In Chinese) https://kns.cnki.net/kcms2/article/abstract?v=GB7hzhCfPWj8iS1E563Ak_wM3L9kHqkkd275_U0Pbc6nbR-CyQNbw7Fpbi74Vvh4adNsuclarNBOwVf4zUPrh0dQzNlE2S-cX-bT-TcC7EbXu1XFi9qPc-T75pPqn-18EYXfI_Z9I53KhF-MavLx2OUddY_P5ZVQWtfG1QuJCmNlY=&uniplatform=NZKPT

[20] Xu, H., Zhou, Z.M., Wu, X.J., *et al.* (2025) Application Effect of Smart Imaging Teaching Mode Based on ChatGPT in Medical Imaging Internship Teaching. *Health Vocational Education*, **43**, 52-56. (In Chinese)

[21] Hong, M.P., Li, L.S., Guo, H.Y., *et al.* (2026) Exploration and Practice of ChatGPT Assisted Teaching in Medical Imaging. *China Higher Medical Education*, No. 1, 108-109, 118. (In Chinese) https://kns.cnki.net/kcms2/article/abstract?v=GB7hzhCfPWi3ceSZoZv4HmOw6x384vm5VTrD-Se2vGk9B9toGzHzPBPR2wAU48VPOF1ZyahdpTjeYnP9f38NnrRvTiI2VZYuDweeV2cXZ1WlXPR39fiXf8o5iH-PhrnzAR2T0B69eXD8WvQJG1pvI0JbZuoU5kCFU6bQTjdamRMo=&uniplatform=NZKPT

[22] Liu, R.N., Wang, Y.G., Hu, H.F., *et al.* (2024) Application of Artificial Intelligence in the Teaching of Medical Imaging Diagnostics. *China Health Industry*, **24**, 144-146. (In Chinese)

[23] Ding, J., Li, Y.H., Xu, J.G., *et al.* (2025) Innovative Model of AI Empowered Medical Imaging Diagnosis Teaching. *China Medical Education Technology*, **3**, 51-53. (In Chinese) https://doi.org/10.61369/mrp.2025040031

[24] Cai, A.H. and Chen, T.J. (2025) Research on the Path of AI Driven Educational Reform of Medical Imaging Diagnostics. *Higher Vocational Education and Modern Nursing*, **8**, 185-189. (In Chinese)

[25] Hu, F.Y., Sun, Z.H. and Zhou, J.G. (2024) Application and Evaluation of Artificial Intelligence Technology in Medical Imaging Teaching. *China Health Industry*, **24**, 152-154. (In Chinese)

[26] Cui, Y.H., Liu, W., Ren, B.Q., *et al.* (2025) Application of "Artificial Intelligence+" in the Cultivation of Practical Abilities for Medical Imaging Students. *Journal of Practical Medical Techniques*, **32**, 805-809. (In Chinese) https://wap.cnki.net/touch/web/Journal/Article/SYYJ202511001.html

[27] Zhang, Z.H., Li, J., Han, D., *et al.* (2021) Discussion on the Application of Pulmonary Nodule AI in Clinical Work of Imaging Interns. *China Continuing Medical Educa-

tion, **13**, 88-92. (In Chinese)
https://kns.cnki.net/kcms2/article/abstract?v=GB7hzhCfPWg-OgsQPmCITpkiT-bvxw3W5RIb9HiBRskQkoU9xskxZpmWomlrFgBeEYjZxO-BXCkm1kskLI3VQYUuzN2_0O6kT58uT1zWovlV4GG6wuKYcgqWGEcO5DyPbyB_pBb05eBmtFC7KDqw11xd-5uxg2HCu7iPNRJduzOBY=&uniplatform=NZKPT

[28] Fan, H.Y., Sun, D.D., Zhang, Q., *et al.* (2021) Comparative Study on the Efficacy of Artificial Intelligence Assisted Detection of CT Pulmonary Nodules by Junior and Senior Standardized Training Physicians. *Chinese Journal of Integrated Traditional and Western Medicine Imaging*, **19**, 175-179. (In Chinese)
https://kns.cnki.net/kcms2/article/abstract?v=Tadyhzi4uod-mPoc0MS_n9ecQ3rWUYiRzTN5VqvBUgtuYtrukLwu12ql7mQzdjyArL-MDVrAuGSWAwzqvzBiGLwIZSqT-lzGUfq2ZiMtfDmzGoeI-UQNgF4nf4ZXi35eP3dYM-rbPR1QR8oMvGXYu7KZP6dUHg32BBl2kWwbWUaSs-chVHZsySiU8QQ==&uniplatform=NZKPT&language=CHS

[29] Li, R., Liu, G., Zhang, M., Rong, D., Su, Z., Shan, Y., *et al.* (2025) Integration of Artificial Intelligence in Radiology Education: A Requirements Survey and Recommendations from Faculty Radiologists, Residents, and Medical Students. *BMC Medical Education*, **25**, Article No. 380. https://doi.org/10.1186/s12909-025-06859-8

[30] Topol, E.J. (2019) High-Performance Medicine: The Convergence of Human and Artificial Intelligence. *Nature Medicine*, **25**, 44-56.
https://doi.org/10.1038/s41591-018-0300-7

[31] Sallam, M. (2023) ChatGPT Utility in Healthcare Education, Research, and Practice: Systematic Review on the Promising Perspectives and Valid Concerns. *Healthcare*, **11**, Article 887. https://doi.org/10.3390/healthcare11060887

[32] Zhang, R.Y., Zhou, Y.A. and Peng, Y.C. (2025) Collaborative Governance Path of Artificial Intelligence Empowering Medical Education. *Chinese Journal of Medical Education*, **45**, 496-501. (In Chinese)
https://kns.cnki.net/kcms2/article/abstract?v=Tadyhzi4uofk-LkLaqZTu_qvVUsNgWTl4lN6JFo9pGRunW-gWS7g5Eu8iAtHxbmDiDUJ_yFvk2Gm8l5CfTM_3oruGo1Qm294lZvf_6l4dFy0ZfxU6aJP-_VN3b0RHHtcXe2VX_2HxGr621QLl6pEuDqtQauL2tusf721YupBj6S7tEB95ox5Dw==&uniplatform=NZKPT&language=CHS

[33] Yuan, L., Xu, J.Y. and Liu, W.Q. (2025) Transformation of Human Machine Collaborative Teaching Paradigm under Digital Intelligence Education Ecology. *Open Education Research*, **31**, 108-117. (In Chinese)