 DOI: 10.19601/j.cnki.issn1943 - 9903.2026.03.009

Exploration on Teaching Reform of Remote Sensing Science and Technology Specialty in the Era of Artificial Intelligence

Yunhai HU, Peiye YANG

School of Human Settlements, Mianyang Teacher's College, Mianyang 621000, China

Abstract In the current teaching of Remote Sensing Science and Technology in higher education institutions, educators must recognize the significant impact and promotional role of artificial intelligence technology on the discipline. This necessitates a comprehensive and deep-rooted reform of the entire curriculum system and places higher demands on talent cultivation. Traditional teaching methods in this field often face prominent challenges, including inadequate technological integration, underdeveloped teaching resources, and insufficient cultivation of students' practical abilities. To address these issues, it is imperative for educators to fully understand how to correctly develop and innovate remote sensing pedagogy in the era of AI. This paper proposes targeted reform strategies focusing on faculty development, curriculum system optimization, teaching resource enrichment, and practical training models. The goal is to attract more students to choose and develop a passion for this major, enabling them to achieve professional success and become highly-skilled talents equipped with interdisciplinary awareness, innovative thinking, and strong practical abilities.

Key words Artificial intelligence (AI), Remote Sensing Science and Technology, Teaching reform

0 Introduction

Remote Sensing Science and Technology, as a comprehensive interdisciplinary field, bears significant responsibilities in contemporary social development. Particularly in recent years, with a series of breakthroughs in artificial intelligence technology, the integration of AI and remote sensing has become an inevitable trend in future teaching. The incorporation of artificial intelligence into the teaching of Remote Sensing Science and Technology can effectively enrich educational content and provide students with more diverse learning experiences. In practical applications, AI can also enhance the intelligent level of remote sensing technology, enabling it to truly keep pace with the times and achieve new breakthroughs. However, the current talent cultivation models in the teaching of Remote Sensing Science and Technology in higher education institutions suffer from issues such as lagging approaches and a lack of diversity, which hinders the effective transformation of professional teaching. Therefore, educators need to guide students to actively explore artificial intelligence technology and integrate it into teaching reforms, thereby innovating the professional curriculum system and talent cultivation models.

1 Challenges confronted by the teaching of Remote Sensing Science and Technology in the AI era

1.1 Weak awareness of integration of traditional curriculum system and technology Against the backdrop of the artificial intelligence era, the current curriculum system for the Remote Sensing Science and Technology major in universities continues to employ traditional teaching methods and content frameworks. This results in the emergence of disciplinary boundaries within professional teaching, causing a disconnect between technology and its application, which hinders the realization of the major's value. When imparting core knowledge of remote sensing, educators lack an awareness of integrating artificial intelligence technologies[1]. The teaching content is also predominantly based on traditional digital image processing methods, without incorporating new content from the AI field. Furthermore, the teaching philosophy of many university instructors is somewhat outdated, emphasizing the rote imparting of knowledge and focusing more on guiding students in operating software rather than teaching them methods of learning and thinking. This weak awareness of pedagogical integration leads to issues such as a fragmented knowledge system and a singular knowledge structure among students, preventing them from truly adapting to and making breakthroughs in tandem with the development of artificial intelligence.

1.2 Insufficient reserve of AI teaching resources In the context of university education in Remote Sensing Science and Technology, educators must also recognize that diverse, high-quality teaching resources constitute an indispensable part of the curriculum and form the foundation for ensuring significant outcomes in pedagogical reform. However, there is currently a shortage of teaching resources in the interdisciplinary field of artificial intelligence and remote sensing. Firstly, there is a lack of integrated textbooks and reference materials on "AI + Remote Sensing," with few authoritative texts available on the market, and the quality of the literature that instructors can draw upon is often inconsistent. Secondly, universities often fail to provide specialized software and hardware teaching platforms for the major, making it difficult to offer students adequate opportunities for learning and practice, which results in a lack of depth in the inquiry-based aspects of practical training. Finally, online teaching resource databases are not well-established; the process of acquiring remote sensing data remains cumbersome, and there is also insufficient

Received: January 3, 2026 Accepted: February 26, 2026

Yunhai HU, master's degree candidate, lecturer, research fields: 3S technology integration and application.

data to support the training of AI models.

1.3 Students' innovative and practical ability needs to be improved In the pedagogical practice of the Remote Sensing Science and Technology major within universities, the integration of artificial intelligence technologies also imposes heightened demands on students' innovative and practical capabilities. However, students currently possess insufficient reserves of both specialized remote sensing knowledge and AI-related interdisciplinary knowledge, and the lack of practical training further inhibits the development of their innovative potential[2]. Furthermore, a disconnect exists between university-level professional instruction, scientific research, and industry. Confined within the "ivory tower" of academia, students have limited exposure to and an inadequate understanding of the latest academic developments and industry demands, consequently hindering the cultivation of their critical thinking and innovative consciousness.

2 Teaching reform strategies of Remote Sensing Science and Technology in the AI era

2.1 Strengthening the training of professional teachers and enhancing the ability of technology integration In the AI era, for the Remote Sensing Science and Technology discipline to pursue reform and innovation, educators, as the executors of such reforms, bear a critically important responsibility. This necessitates that universities strengthen the training of faculty teaching specialized courses, enhancing their AI technological literacy and their ability to innovate and integrate curricula. Firstly, institutions can plan to recruit more faculty with backgrounds in computer science and AI, effectively strengthening and expanding the current teaching team and injecting new energy into pedagogical reform. Concurrently, universities should vigorously train existing faculty by organizing professional forums and conferences, inviting renowned scholars and industry experts to campus to discuss specialized topics and engage in exchanges within the teaching field. Secondly, universities can establish dedicated teaching reform funds to encourage remote sensing educators to incorporate AI-related content into their own research projects, thereby building a repository of teaching cases and resources. They can also facilitate the formation of interdisciplinary teaching teams across departments—including remote sensing, computer science, and geosciences—where multiple educators collaborate on course preparation and discussions, deepening the current curriculum through mutual cooperation. More importantly, a normalized communication mechanism must be established among teachers themselves, between universities, and between academia and industry, ensuring that professional instruction aligns with the latest academic developments and industry demands, thereby maintaining the cutting-edge nature of educators' knowledge systems.

2.2 Optimizing the professional curriculum system and building a dual-track training model In the process of advancing pedagogical reform and development for the Remote Sensing Science and Technology discipline in the AI era, educators must vigorously optimize the current curriculum system, effectively breaking down traditional disciplinary barriers. This enables students to strengthen their foundational knowledge, emphasize integration, and foster innovation within their specialized studies. On this basis, AI can be leveraged to empower teaching, leading to the development of more school-based curricula with integrative characteristics, such as "Python Programming for Remote Sensing" and "Big Data Analytics and Cloud Computing in Remote Sensing." These courses not only stimulate students' interest in inquiry through novel teaching content and methods but also allow them to center their learning around remote sensing problems while attempting to operate corresponding AI models practically. Instructors can adopt project-based learning approaches, guiding students to engage in comprehensive learning through practical activities like the "Integrated AI Remote Sensing Course Design," collaborating with project team members to achieve the objectives of the practical tasks[3]. Building upon an optimized curriculum system, educators can also explore a "dual-track cultivation model," comprising a "technical deepening" track and an "applied innovation" track. These tracks differ in their focal points, allowing students to choose based on their interests. This dual-track parallel curriculum cultivation approach caters to students' individualized development and meets the diverse needs of society.

2.3 Developing AI teaching resources and building an intelligent teaching platform As AI continues to evolve, instructors in remote sensing programs need to invest serious effort in developing AI-powered teaching resources and building smart learning platforms for their students. A good starting point is creating and sharing specialized resource databases—this means teaming up with other universities strong in relevant fields, and partnering with research institutes and companies outside campus to co-write targeted textbooks and materials. Not only does this bring in more high-quality content for courses, but it also opens up channels for broader collaboration and exchange. With AI in the picture, schools should also roll out intelligent teaching platforms that pack in tools for course management, online labs, and computing support—giving students far more room to experiment and learn by doing. These platforms can be designed as interactive spaces that act like a "scaffold" for learning, offering access to deep learning frameworks and remote sensing libraries, and linking up with the university's GPU clusters or tapping into cloud computing power so students always have robust resources at their fingertips[4]. Big data can also come into play here: by tracking how students perform in their courses, the system can run personalized analyses and recommend targeted content, helping pinpoint where individual students might be struggling. Instructors could even take it a step further and build an "AI + Remote Sensing" Q&A chatbot—a handy tool that students can turn to anytime for answers, making learning more interactive and responsive.

2.4 Creating thematic project activities to promote collaborative education between industry and education Within the AI-enhanced Remote Sensing Science and Technology discipline, instructors can create thematic project activities to provide students with broader spaces for practice and inquiry. Students are required to conduct in-depth research on projects over a semester or aca-

demic year, such as "Dynamic Monitoring of Smart Cities" or "Emergency Response to Major Natural Disasters." In this process, learning groups are scientifically structured to comprehensively collect key project data and information, integrating acquired knowledge to complete the entire workflow—from data collection and algorithm selection to system development and report writing—thereby effectively assessing students' practical competencies. Students are also encouraged to participate in AI remote sensing competitions during their spare time, demonstrating their learning and exploratory capabilities through competitive engagement, and stimulating innovative potential within both competitive and collaborative contexts. Such practical training effectively lays a solid foundation for later-stage industry-education collaborative cultivation. Universities can establish off-campus remote sensing laboratories and practice bases in partnership with enterprises in the remote sensing technology sector. This process gives rise to a "dual-mentor" teaching model, featuring "on-campus mentors imparting knowledge and off-campus mentors guiding practice", jointly forming a remote sensing AI talent cultivation alliance that achieves seamless alignment between talent development and industrial demands.

3 Conclusions

In summary, the advent of the AI era presents opportunities for deepening reform in Remote Sensing Science and Technology, while simultaneously imposing higher demands on university talent cultivation models. In the near future, as technology continues to advance, the Remote Sensing Science and Technology discipline will undergo dynamic adjustments and iterative evolution in response to the times. This requires educators to innovate their teaching philosophies, enhance their instructional competencies, deepen the integration of industry and education, and cultivate innovative talents in the remote sensing field who can truly lead the future and harness intelligent technologies.

References

[1] HE Y, LIU T, YAN HW, *et al.* Teaching reform and practice in the course of microwave remote sensing in the era of artificial intelligence [J]. Hydrographic Surveying and Charting, 2025, 45(4): 66 – 71. (in Chinese).

[2] SUN YG, NIU ZY, ZHAO JY, *et al.* Exploration and practice of smart classrooms in the era of artificial intelligence: A case study of "Remote Sensing Geoscience Analysis and Applications" [J]. Advances in Social Sciences, 2025,14(8): 308 – 313. (in Chinese).

[3] YAO FQ, NING SX, DU SW, *et al.* Exploration on the Reform of Innovative Talent Training Mode for Remote Sensing Science and Technology Majors Based on OBE Concept [J]. The Theory and Practice of Innovation and Enterpreneurship, 2024(5): 155 – 159. (in Chinese).

[4] JIN YT, ZHU X, YAN XJ, *et al.* Construction and implementation path of local university graduate training mode under the new development concept: Taking Remote Sensing Science and Technology Specialty as an example [J]. Journal of Higher Education, 2025, 11(20): 171 – 174. (in Chinese).

(From page 38)

[6] SCHMIDT M, SCHULER S C, HUTTNER S S, *et al.* Adult stem cells at work: Regenerating skeletal muscle [J]. Cellular and Molecular Life Sciences, 2019, 76(13): 2559 – 2570.

[7] KOOPMANS T, van ROOIJ E. A dualistic approach to heart repair through FGF10 [J]. Cardiovascular Research, 2022, 118(12): 2564 – 2565.

[8] WATSON J, FRANCAVILLA C. Regulation of FGF10 signaling in development and disease [J]. Frontiers in Genetics, 2018, 9: 500.

[9] XU Q, LIN S, WANG Y, *et al.* Fibroblast growth factor 10 (FGF10) promotes the adipogenesis of intramuscular preadipocytes in goat [J]. Molecular Biology Reports, 2018, 45(6): 1881 – 1888.

[10] HAN L, FU R, FU B, *et al.* Integrating metabolomics and transcriptomics to analyze differences in muscle mass and flavor formation in Gayal and yellow cattle [J]. Frontiers in Veterinary Science, 2025, 12: 1581767.

[11] ONUKI Y, NANASHIMA N, SASAKI Y, *et al.* Oxaloacetate and ketone bodies synergistically promote myoblast differentiation in L6 Cells [J]. Molecules, 2025, 30(10): 2101.

[12] CHAL J, POURQUIÉ O. Making muscle: skeletal myogenesis *in vivo* and *in vitro* [J]. Development, 2017, 144(12): 2104 – 2122.

[13] HAN D, ZHAO H, PARADA C, *et al.* A TGFβ-Smad4-Fgf6 signaling cascade controls myogenic differentiation and myoblast fusion during tongue development [J]. Development, 2012, 139(9): 1640 – 1650.

[14] PAWLIKOWSKI B, VOGLER T O, GADEK K, *et al.* Regulation of skeletal muscle stem cells by fibroblast growth factors [J]. Developmental Dynamics, 2017, 246(5): 359 – 367.

[15] OMBRATO L, LLUIS F, COSMA M P. Regulation of self-renewal and reprogramming by TCF factors [J]. Cell Cycle, 2012, 11(1): 39 – 47.

[16] ZHANG X, HE L, WANG L, *et al.* CLIC5 promotes myoblast differentiation and skeletal muscle regeneration via the BGN-mediated canonical Wnt/β-catenin signaling pathway [J]. Science Advances, 2024, 10(41): eadq6795.

[17] WANG M, YANG J, WU Y, *et al.* Curcumin-activated Wnt5a pathway mediates Ca^{2+} channel opening to affect myoblast differentiation and skeletal muscle regeneration [J]. Journal of Cachexia, Sarcopenia and Muscle, 2024, 15(5): 1834 – 1849.

[18] BAEK J, LOPEZ P A, LEE S, *et al.* Egr1 is a 3D matrix-specific mediator of mechanosensitive stem cell lineage commitment [J]. Science Advances, 2022, 8(15): eabm4646.

[19] ZHANG W, TONG H, ZHANG Z, *et al.* Transcription factor EGR1 promotes differentiation of bovine skeletal muscle satellite cells by regulating *MyoG* gene expression [J]. Journal of Cellular Physiology, 2018, 233(1): 350 – 362.

[20] PAN H, GUSTAFSSON M K, ARUGA J, *et al.* A role for Zic1 and Zic2 in Myf5 regulation and somite myogenesis [J]. Developmental Biology, 2011, 351(1): 120 – 127.

[21] CAIRNS D M, LIU R, SEN M, *et al.* Interplay of Nkx3.2, Sox9 and Pax3 regulates chondrogenic differentiation of muscle progenitor cells [J]. PloS One, 2012, 7(7): e39642.

[22] POSEY E A, DAVIS T A. Review: Nutritional regulation of muscle growth in neonatal swine [J]. Animal, 2023, 17 Suppl 3(Suppl 3): 100831.

[23] RIMMER L A, GEISBRECHT E R, CHAO M D, *et al.* Skeletal muscle metabolism is dynamic during porcine postnatal growth [J]. Metabolites, 2024, 14(7): 357.