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Research on the Talent Training Model for Medical Imaging Technology Professionals that Integrates "Post Course Competition and Certification" Under the Background of Artificial Intelligence

Hui Chen [1, a], Lisha Wu [1], Ming Li [2], Lili Jiang [1, *]

[1] School of Healthcare Technology, Chengdu Neusoft University, China
[2] School of International Business, Chengdu International Studies University, China

*** Corresponding author:** Lili Jiang (Email: JiangLili@nsu.edu.cn), [a] ChenHui@nsu.edu.cn

Abstract: With the rapid development of artificial intelligence (AI) technology, the field of medical imaging technology is undergoing revolutionary changes. In order to adapt to this change, the training model for medical imaging technology professionals is in urgent need of innovation and optimization. Based on social needs and technological development trends, this study proposes to establish the AI concept, constructs a multi-level curriculum system based on the integration of "post course competition and certification" training goals, promotes professional practice with vocational skills competitions, and builds a skills certificate as the foothold. The talent training mechanism that emphasizes both education and training provide reference and reference for the reform of the talent training model for medical imaging technology professionals.

Keywords: Artificial Intelligence; Medical Imaging Technology; Talent Training Model.

1. Introduction

As an important branch of the medical field, medical imaging technology is facing unprecedented development opportunities and challenges as the demand for precise diagnosis and personalized treatment in the global medical and health field continues to grow. Artificial intelligence algorithms are used in the field of radiology to analyze various images, including X-rays, CT, ultrasound and MRI images, to assist in the detection, localization and classification of diseases. This not only improves the accuracy and efficiency of diagnosis, but also has a positive impact on medical imaging technology. Professional talents have put forward new skill requirements, requiring future medical imaging technology talents to not only possess traditional medical imaging knowledge, but also master relevant AI technology and data analysis capabilities. However, the existing talent training model for medical imaging technology professionals cannot meet these new requirements and is out of touch with industry development needs, especially in the integration and application of artificial intelligence technology, which limits their ability to adapt to future work [1]. Therefore, exploring and building a training model for medical imaging technology professionals that adapts to the era of artificial intelligence is of great significance for improving the quality of medical services and promoting the sustainable development of the medical and health industry. This study aims to conduct an in-depth analysis of the current dilemmas faced by the training of medical imaging technology professionals, and propose an innovative talent training model combined with the development of artificial intelligence technology. Through this study, it is expected to provide theoretical guidance and practical reference for professional education in medical imaging technology, so as to cultivate more high-quality skilled talents who can adapt to future medical and health needs.

2. Realistic Logic and Value Implications

2.1. Technology-driven Logic

A new round of industrial transformation with artificial intelligence as the core combines technologies such as cloud computing, artificial intelligence, and the Internet with traditional the organic integration of industries has given rise to new industries, new occupations, and new positions. AI is gradually becoming a key driving force in the field of medical imaging. Through its powerful data processing capabilities and pattern recognition algorithms, AI not only greatly improves the analysis efficiency and diagnostic accuracy of medical images, but also plays an important role in the formulation of individualized treatment plans. In the current field of medical imaging, the application of AI runs through the entire process from raw data preprocessing to intelligent diagnosis of disease to assisted clinical decision-making. The implementation of AI medical imaging can be divided into three key stages: first, accurate analysis and processing of medical imaging data; second, the use of algorithms to classify diseases; finally, AI technology is used to improve the accuracy and efficiency of disease screening, thereby assisting doctors in Make more accurate judgments in clinical diagnosis. The contribution of AI in the field of medical imaging diagnosis is that AI can extract key information from patients' imaging data through its highly developed image recognition capabilities. This is especially valuable for less experienced doctors and can effectively improve their interpretation of medical images. accuracy and efficiency. Secondly, deep learning is used to learn from massive imaging data and clinical diagnosis results to build a powerful disease diagnosis model, effectively reducing the risk of missed diagnosis and misdiagnosis. Through this AI-driven

medical imaging technology, the medical industry can screen and diagnose diseases more efficiently, greatly improving the quality and efficiency of medical services. With the continuous advancement of technology and the deepening of its application, AI medical imaging will undoubtedly play a more important role in the future medical and health field[2].

2.2. Policy Guidance Logic

The National Vocational Education Conference in 2021 emphasized the necessity of deepening education reform, especially the "three education" reform, that is, the reform of teachers, teaching materials, and teaching methods, in order to achieve talent training under the integration of "post course competition and certification" and thereby improve Education level. The Digital Education Conference held in 2024 pointed out that artificial intelligence empowerment actions will be implemented to promote the in-depth integration of intelligent technology with education, teaching, and scientific research[3]. Therefore, the training of applied technical talents needs to optimize the "post course competition and certification" integrated education system, integrate artificial intelligence technology into every aspect of education, and develop a systematic and modular system based on the actual needs of professional positions. The course structure is designed to significantly enhance students' professional skills and comprehensive qualities. This poses new challenges and goals for the training of imaging technology talents in the context of the new era.

2.3. Value Implication Logic

Carry out research on the integrated talent training model of "post course competition and certification" under the background of artificial intelligence, which can adapt to the needs of the intelligent and digital era, fully improve the integration of digital technology and traditional teaching, and effectively solve the separation of jobs and classes and the disconnect between classes and competitions in the talent training process, course certificate disembedding and other issues, it is conducive to cultivating high-quality skilled talents that adapt to the needs of economic and social development under the background of artificial intelligence, and provides guidance and reference for applied universities to deepen the reform of talent training models.

3. Current Status of Professional Training in Medical Imaging Technology

3.1. Education Model is Out of Touch with Industry Needs

With the continuous advancement of medical technology, medical imaging technology plays an increasingly prominent role in disease diagnosis, treatment planning, and efficacy evaluation. However, some universities have failed to update their professional settings in a timely manner, resulting in a disconnect between teaching content and actual medical needs. The main existing problems include:

(1)Course content is out of touch with practical applications, and teaching content lags behind: Courses in medical imaging technology majors often focus on basic theories and traditional skills, but lack in-depth teaching on the application of AI in medical imaging. The knowledge students learn in school is difficult to directly apply in actual work, especially those advanced analysis and diagnosis tasks that require the support of AI technology. Moreover, the technology in the field of medical imaging technology is updated rapidly, and new AI algorithms and imaging equipment are constantly emerging. However, the update of teaching content often fails to keep up with the pace of technological development, resulting in students' limited understanding of the latest technology.

(2)Insufficient cross-integration between medicine and industry: Medical imaging technology, as an emerging branch of medicine, has developed rapidly in recent years in response to modern medicine's demand for professional operation, maintenance and management talents of high-end imaging equipment. In today's medical field, cutting-edge concepts such as "artificial intelligence", "big data", "precision medicine" and "image navigation" are gradually replacing traditional understanding of medical imaging. Therefore, when cultivating medical imaging technology professionals, colleges and universities should not only focus on basic imaging scanning skills, but should focus on cultivating innovative professionals with profound theoretical knowledge, superb application skills and sustainable development potential. At present, many medical schools in China have shortcomings in the construction of educational systems for medical imaging technology[4]. In particular, insufficient attention is paid to science degrees, resulting in an imbalance in the distribution of clinical medicine and science course hours, and defects in the field of cross-education between medicine and engineering. In addition, the collaboration and integration between medicine and science and engineering have not yet reached an ideal state, and there is an urgent need to strengthen the internal connection between the two.

(3)Insufficient practice opportunities: The carrier of medical imaging technology practice is expensive large-scale imaging equipment, and schools do not have the financial ability to deploy and use a large number of cutting-edge medical imaging equipment. During clinical internships in hospitals, due to the large number of patients, opportunities for students to personally operate medical equipment are relatively limited. As a result, courses that should be practice-oriented often become teacher-centered one-way knowledge transfer, and most students are in a state of passive acceptance. This undoubtedly brings difficulties to the cultivation of applied medical imaging technology talents with practical operation capabilities. challenge. According to the survey[5], most schools offering medical imaging technology majors across the country adopt a teaching model that first focuses on theoretical learning, then conducts preliminary practice through on-campus virtual simulation, and finally conducts actual operations in affiliated hospitals. This separation of theoretical and practical teaching links and insufficient time for practical teaching in schools are common in most institutions.

(4)Lack of industry feedback mechanism: The improvement of the education model requires feedback and guidance from the industry. However, there is a lack of communication and cooperation between schools, medical institutions, and imaging technology companies, resulting in a gap between educational content and actual industry needs.

3.2. Insufficient Teachers and Teaching Resources

The medical imaging technology major requires teachers to have solid professional knowledge and rich practical

experience. However, most institutions face the problem of weak teaching staff, especially the lack of professional teachers with clinical practice experience. In addition, medical imaging equipment is expensive and updates rapidly. Due to financial constraints, some colleges and universities are unable to provide students with sufficient and modern imaging equipment for practical operations, which affects the cultivation of students' practical skills [6].

3.3. Insufficient practical teaching and school-enterprise cooperation

The cultivation of practical abilities of students majoring in medical imaging technology has high requirements on experimental equipment and practical training environment. At present, the laboratory construction in some colleges and universities is lagging behind and the training facilities are outdated, making it difficult to simulate the real working environment. At the same time, the school-enterprise cooperation mechanism is not perfect, and students lack opportunities to intern in medical institutions, making it difficult for them to quickly adapt to the work environment after graduation, which affects the quality of employment and career development.

3.4. There is a disconnect between the curriculum system and the certification system

The curriculum system of the medical imaging technology major should be closely connected with the national and industry certification systems to ensure that students can obtain industry-recognized qualification certificates after graduation. However, the curriculum of some institutions is out of touch with the certification system. After completing their studies, students need to take additional training and examinations to obtain corresponding certificates. This not only increases the financial burden of students, but also affects their employment competitiveness. In order to solve the above problems, colleges and universities should actively adjust their professional settings, strengthen the construction of teaching staff, improve practical teaching conditions, deepen school-enterprise cooperation, comprehensively improve the comprehensive quality of students, and make positive contributions to promoting the sustainable development of the medical and health industry.

4. A Talent Training Strategy for Medical Imaging Technology Professionals That Integrates "Post Course Competition and Certification" under the Background of Artificial Intelligence

In the context of artificial intelligence, the talent training reform of applied technology colleges and universities should take the concept of intelligence and digitalization as the core, deeply analyze job requirements, and refine and integrate elements such as national and provincial skill competitions, vocational qualification certification and vocational skill level certification into curriculum design. Through this integration, a talent training model of "one core, dual elements, three integrations and four connections" has been built, as follows: "One core": with the fundamental goal of cultivating students with digital literacy and professional skills in the AI era, strengthening their Action and problem-solving skills in the professional field. "Dual": Involving the two key educational subjects of schools and hospitals, through school-hospital cooperation, an in-depth connection between educational resources and job needs is achieved. "Three Integration": Create a curriculum system that integrates job requirements, competition projects and certificate education, so that students' learning content is closely connected with future work. "Four Links": Use AI technology to realize the intelligence and digitization of teacher teaching, teaching material content, teaching methods and student evaluation, and promote the modernization and intelligence of the education process. Under this model, AI technology is not only used as part of the teaching content, but also as a tool to improve the efficiency and quality of education, throughout the entire teaching and evaluation process. This talent training model aims to cultivate high-skilled talents who can meet the needs of future medical imaging and other professional fields, while also promoting the digital transformation of university education.

4.1. Establish the concept of artificial intelligence and cultivate technical talents in the context of cross-disciplinary integration development

In order to adapt to the rapid development of medical imaging technology, it is necessary to establish an educational concept with artificial intelligence as the core and strive to cultivate students' comprehensive quality and practical ability in this field. At present, artificial intelligence technology has become an important driving force for the advancement of medical imaging technology, and has a significant impact on improving the quality of diagnosis and treatment and optimizing workflow. With the digital transformation of the medical industry, medical imaging professionals who master AI technology are crucial to promoting innovation in medical service models and improving medical efficiency. Talent training in medical imaging technology must keep pace with technological development and integrate the concept of artificial intelligence throughout the entire process of talent training. This not only involves teaching the basic knowledge of AI, but also emphasizes students' ability to apply AI technology for medical image analysis and diagnosis in practical work. Through this education model, we cultivate professionals who can adapt to the development needs of future medical imaging technology, while stimulating students' innovative potential and providing talent support for technological innovation and application practice in the field of medical imaging.

4.2. Determine talent training goals based on the "post course competition and certification" integration model

In the process of building a training model for medical imaging technology professionals, the integration strategy of "post course competition and certification" was adopted, and a professional construction steering committee was established. The committee is composed of senior experts from the hospital's imaging department. This committee is responsible for clarifying the specific goals of talent training and formulating a set of educational plans that are both scientific and practical. In this model, "post" is the starting point and foothold of education, providing the basis and

standards for skills competitions and professional qualification certifications, ensuring that the direction of education is consistent with industry values. "Course", as the core platform for talent training, is not only a medium for knowledge transmission, but also a key link to achieve the integration of "post course competition and certification". The focus of the curriculum reform is to meet job requirements, with clinical cases as the core, and in cooperation with medical institutions, a curriculum system with modularity and ability progression is developed. The system integrates the requirements for professional qualification certificates and incorporates the latest technology and industry norms in the field of medical imaging. "Competitions" play a leading and demonstrative role in this system. By integrating elements of national skills competitions and innovation competitions into the curriculum, actual qualification certificates and skills competition standards are used as teaching goals to achieve teaching content. Integration with occupational skill requirements. The implementation of this teaching model combines competition projects with talent training plans to promote the in-depth integration of courses and competitions.

Finally, by taking work projects as the main line of teaching, the key points of professional qualification certification and skills competitions are integrated into teaching to achieve a comprehensive integration of "positions, courses, competitions, and certificates" and promote innovation in the training model for medical imaging technology professionals. Reform to cultivate high-quality professionals who not only meet industry standards but also possess innovative capabilities and practical skills.

4.3. Based on the integration of "post course competition and certification", starting from job ability needs and driven by projects, create a multi-level curriculum system

The curriculum system of the medical imaging technology major should be closely integrated with the latest needs of the medical industry. Focusing on the actual work process of imaging technicians, by docking real work needs, and based on students' cognitive development rules, a set of progressive modular abilities should be designed. curriculum structure. The system covers a series of teaching modules for progressive skills, from basic anatomy and physiology knowledge to advanced equipment operating principles, to image shooting, diagnosis of common diseases, and artificial intelligence-assisted image data analysis. Two courses, "Python" and "Application of Deep Learning in Medical Images", have been added to build a medical imaging artificial intelligence application and practice module. This module combines medical imaging technology and artificial intelligence to enable students to master medicine through theoretical learning and practical operations. The basic principles, common algorithms and application practices of imaging artificial intelligence. Practical content includes: using programming languages such as Python for medical image processing and analysis, using AI algorithms to extract features from medical image data to aid diagnosis, etc.

In addition, it is necessary to ensure that the course content has clear career orientation, sufficient flexibility, openness, and practical application. The core goal of curriculum design is to cultivate applied talents with high-quality technical skills. In the teaching and evaluation system of the medical imaging technology major, the rate of obtaining relevant professional qualification certificates is regarded as the key to evaluating students' technical abilities and professional practical skills. index. According to the real needs of medical imaging technology positions, teaching activities centered on solving specific problems are carried out to guide students to learn and master necessary theoretical knowledge and operating skills in practical operations. The teaching content closely focuses on key job skills such as medical imaging equipment operation (such as DR, CT, MRI, ultrasound, interventional). Based on the specific requirements of professional skills for each position, a phased and progressive teaching plan is adopted to gradually improve Students' professional basic skills, core skills and comprehensive skills; enhance students' practical abilities and cultivate their ability to solve practical problems. For example, by constructing clinical cases, students participate in practical work such as imaging scanning, diagnosis, and report writing. This teaching method can not only improve students' clinical thinking, but also exercise their practical skills. This project-driven teaching model ensures that students not only master professional knowledge, but also acquire practical skills closely related to future jobs.

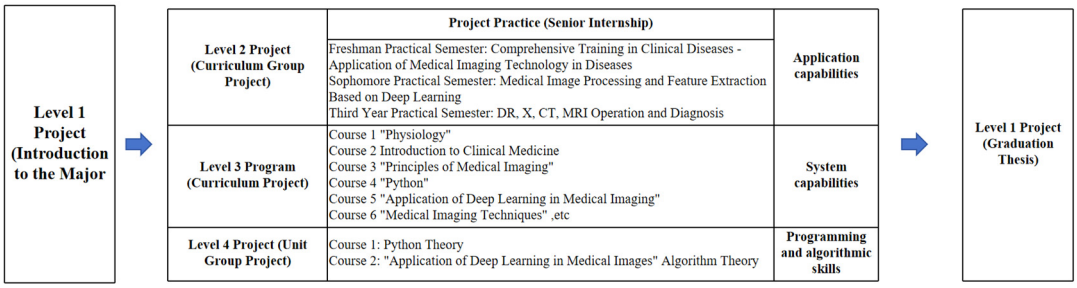

Figure 1. Project-driven multi-level curriculum system

Chengdu Neusoft University implements the "1321" semester setting, that is, one academic year is divided into three semesters, two theoretical semesters based on cases and projects, and one practical semester focusing on ability training. Students conduct project-driven practical teaching in the practical semester of concentrated ability training. According to the content characteristics of the project, it is divided into first-level projects (professional introduction/graduation thesis), second-level projects (course group projects), and third-level projects (Course projects), fourth-level projects (unit group projects) (Figure 1), and form a corresponding relationship with the four levels of practical courses. The projects at each level focus on phased ability development, and the selected projects are appropriately decomposed and expanded, making it run through basic practice, professional practice, comprehensive

practice and applied practice, which is conducive to the connection and integration of practical course content (Figure 2). Students can not only apply the theoretical knowledge they have learned to practice, but also learn new knowledge in practice and improve their ability to solve complex problems

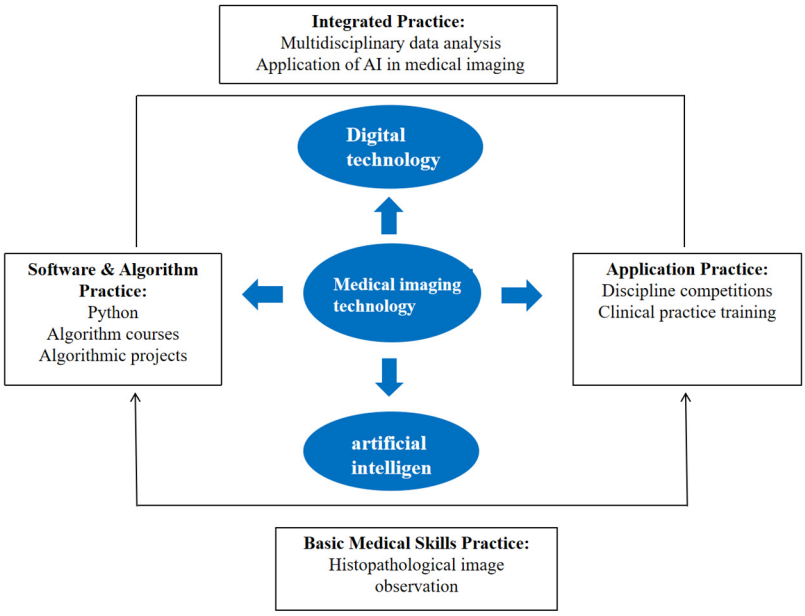

Figure 2. Practical teaching system framework

4.4. Integrate lessons and competitions, integrate competitions and teaching, and promote learning through competitions

In order to achieve a deep integration of teaching and practice, a strategy that combines course learning with skills competitions can be adopted to promote teaching innovation and learning motivation. The skills competition is not only a comprehensive test of the knowledge and skills students have learned, but also an important way to stimulate students' enthusiasm for learning and improve their professional quality. By integrating the standards and requirements of the National Medical Imaging Technology Skills Competition into course teaching, we ensure that the teaching content is forward-looking and industry relevant. This method of "integrating classes and competitions" can expand the influence of the competition, allowing more students to participate in the competition and experience the challenges and incentives of the competition. Design teaching modules that are closely connected with the competition. These modules not only cover the core assessment points of the competition, but also cover the latest advances and specifications in medical imaging technology. In the implementation of teaching, various teaching methods such as case teaching, situation simulation, and heuristic guidance can be used to enhance students' practical operation ability and problem-solving ability. In addition, we must also focus on cultivating students' sense of professional honor and self-confidence, using the incentive mechanism of competitions to stimulate students' learning initiative, and strengthen their mastery of professional knowledge and the application of professional skills [7].

4.5. Establish a Professional Qualification Certificate Evaluation Mechanism with Medical Institutions, Medical Equipment Companies, Etc.

Cooperate with medical institutions and medical equipment companies to establish a professional qualification certificate training and evaluation system. Students are encouraged to obtain professional qualification certificates such as radiographers and sonographers after completing their senior year internship to enhance their professional skills and employment competitiveness. At the same time, certificate training and course learning are combined to achieve mutual recognition of credits and reduce students' additional learning burden.

5. Conclusion

In the wave of artificial intelligence, the talent training model for medical imaging technology professionals is facing unprecedented opportunities and challenges. The training of talents majoring in medical imaging technology under the integrated model of "job-course competition and certificate" is a new talent training model that adapts to the development of the times, and is an important way to promote talent training. Its core is to deeply integrate "job requirements, course content, skills competitions, and qualification certificates", emphasizing the close integration with industry needs, highlighting the cultivation of practical abilities, and the importance of innovative spirit and technology application capabilities, and is oriented to In the future, we look forward to cultivating more professionals who can lead the development of medical imaging technology through the in-depth integration of education and practice, and contribute to the implementation of the Healthy China strategy.

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References

[1] Yang Lihua, Liu Yuanyuan, Ren Hongli, Wang Meng. Exploration and research on the talent training model of higher vocational medical imaging technology professionals integrated with "job course competition certificate" [J]. Science and Technology Wind, 2023, (14): 37-39.

[2] Zhu Lubing, Wang Jianhua. Research progress of medical imaging artificial intelligence in precise diagnosis and treatment of pancreatic cancer [J]. New Medicine, 2024, 55 (03): 153-158.

[3] Artificial intelligence makes education better - a review of the parallel conference on artificial intelligence and digital ethics at the 2024 World Digital Education Conference [J]. China Education Informatization, 2024, 30 (03): 25-30.

[4] Liu Hong, Xu Xiaoping, Huang Gang, Xiao Han. Establishment and practice of talent training model for applied medical imaging technology professionals [J]. Chinese Modern Distance Education of Traditional Chinese Medicine, 2022, 20 (08): 158-160.

[5] Liu Xuelian, He Ke, Zhang Qihua, Chen Zhen. Application of PDCA in quality control of rotation registration manual for residential training students [J]. Continuing Medical Education, 2020, 34 (12): 32-34.

[6] Liu Hong, He Peizhong, Zhou Jinzhu, Shen Xiuming. Research on the training of medical imaging technology professionals [J]. Health Vocational Education, 2018, 36 (18): 146-147.

[7] Luo Zhaoxia, Rong Luqing. Exploration of practical teaching model integrating competition and teaching in economics and management major under the concept of "promoting learning through competition" [J]. Journal of Science and Education, 2023, (32): 27-29.