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Exploration of the Cultivation Path for Medical and Health Talents in Vocational Undergraduate Programs from the Perspective of Industry-Education Integration

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Abstract: The cultivation of medical and health talents in vocational undergraduate programs is a practical demand for applied talents put forward by the Healthy China strategy and the construction of the Hainan Free Trade Port. In view of the prominent problems in the current training process, such as insufficient depth of integration between industry and education, unclear positioning at the undergraduate level, weak adaptability of the curriculum system, and weak practical teaching links, this paper, supported by the theories of collaborative governance, human capital, and the attributes of vocational education types, proposes a four-dimensional path of governance mechanisms, curriculum systems, practical teaching, and teaching staff. Hainan Vocational University of Science and Technology has carried out empirical research in the reconstruction of the training programs for four vocational undergraduate programs, namely nursing, health management, rehabilitation therapy, and smart health and elderly care management, by taking the six-dimensional integration of positions, courses, competitions, certificates, innovation and research as the carrier. Research shows that the six-dimensional integration model can effectively enhance the coupling degree between industrial demands and training objectives, achieve the gradient connection between undergraduate-level capabilities and junior college-level practices, and provide a reference for the cultivation of medical and health-related vocational undergraduate talents in similar institutions.

Keywords: Integration of industry and education; Vocational undergraduate; Medical and health care category; Talent cultivation; Hainan Free Trade Port

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1. Introduction

The “Healthy China 2030” Planning Outline elevates” health “to a national strategy and clearly states that efforts should be made to strengthen the construction of health human resources [1]. On December 18, 2025, the Hainan Free Trade Port will be fully opened and put into operation, which will significantly increase

the demand for internationalized and compound medical and health talents. In February 2026, the Ministry of Education issued the "Opinions on Deepening the Reform of Key Teaching Elements in Vocational Education" (Jiaozhicheng [2026] No. 1), clearly designating the integration of industry and education as the connection point for the reform of the five key teaching elements: specialties, courses, textbooks, teachers, and internships and practical training [2]. In June of the same year, the "Five-Year Action Plan for the 'Skillful Free Trade Port' (2026-2030)" (Qiong Fu Ban [2026] No. 31) further required deepening the integration of industry and education to cultivate high-skilled talents suitable for the construction of the free trade port [3]. In July of the same year, the Department of Education of Hainan Province issued the "Notice on Further Deepening the Reform of Key Teaching Elements in Higher Vocational Education" (Qiong Jiao Gao [2026] No. 58), promoting the implementation of the reform of key teaching elements in provincial vocational colleges [4]. The above-mentioned policies provide clear policy guidance and broad development space for the reform of medical and health talent cultivation in vocational undergraduate programs [5].

As a high-level extension of the type attribute of vocational education, vocational undergraduate education requires the addition of research literacy, evidence-based decision-making and technological innovation capabilities at the undergraduate level on the basis of practical abilities at the junior college level. However, at present, the cultivation of medical and health talents in vocational undergraduate programs still faces prominent problems such as insufficient depth of industry-education integration, unclear positioning at the undergraduate level, weak adaptability of the curriculum system, and weak practical teaching links, which restrict the improvement of talent cultivation quality. From the existing research, it can be seen that the academic community has conducted relatively rich discussions on the integration of industry and education at the higher vocational level [6-8]. However, the research on the integration path of industry and education for the cultivation of medical and health talents in vocational undergraduate education is still insufficient, and it is urgent to conduct systematic research in combination with the type attributes of vocational undergraduate education and the characteristics of the undergraduate level. The deficiencies of the existing research are mainly reflected in the following aspects: First, the grasp of the type attributes of vocational undergraduate education is not accurate enough; Second, the research on the path for cultivating abilities at the undergraduate level is not in-depth enough. Third, the research on the intrinsic relationship between industry-education integration and the cultivation of vocational undergraduate talents is not systematic enough. This paper attempts to make up for the above deficiencies, conducts research on the path of cultivating medical and health talents in vocational undergraduate programs from the perspective of industry-education integration, and combines the practical exploration of Hainan Vocational University of Science and Technology, with the aim of providing references for similar institutions. The research adopts the methods of literature review, case study and field investigation to sort out the relevant policies and theories of industry-education integration, analyze the practical predicaments and typical practices of cultivating medical and health talents in vocational undergraduate education, and on this basis, propose implementation paths and conduct empirical verification. The full text is divided into five parts: The first part defines the core concepts and theoretical basis; The second part analyzes the real predicaments and typical practices; The third part proposes the implementation path; Part Four: Empirical Analysis of the Six-dimensional Integration Model of Hainan Vocational University of Science and Technology Part Five: Summary, Conclusion and Outlook. Among them, the literature research method mainly involves searching academic databases such as China National Knowledge Infrastructure (CNKI), Wanfang Data, and Web of Science to sort out core literature

and policy documents in fields such as industry-education integration, vocational undergraduate education, and the cultivation of medical and health talents. The case study method mainly selects typical cases such as Jinhua Polytechnic University and KingMed Diagnostics Group to analyze their practical models and experiences of industry-education integration. The field research method mainly targets full-time teachers, current students, graduates and cooperative hospitals (enterprises) of the four vocational undergraduate programs of Hainan Vocational University of Science and Technology to conduct research and collect first-hand data.

2. Theoretical basis and concept definition

2.1. Core concepts

The integration of industry and education refers to the multi-dimensional collaboration between industry and education in aspects such as talent cultivation, technological services, employment and entrepreneurship. Its essence is the structural coupling of industrial demands and educational supplies. In 2017, the General Office of the State Council issued the "Several Opinions on Deepening the Integration of Industry and Education", elevating the integration of industry and education to a strategic measure for national education reform and industrial transformation and upgrading [9]. In terms of connotation, the integration of industry and education encompasses three dimensions: The first is the integration of industry and education in the dimension of talent cultivation, that is, the in-depth connection between industrial demands and training objectives; The second is the integration of industry and education in the dimension of science and technology services, that is, the mutual promotion of industrial technological progress and the research capabilities of colleges and universities. The third is the integration of industry and education in the dimension of employment and entrepreneurship, that is, the precise matching of college graduates with the employment demands of industries.

Vocational undergraduate education is a type of high-level vocational education that was piloted by the state in 2019 [10] and established in legal form under the newly revised Vocational Education Law in 2022 [11]. It requires students to possess both the practical ability at the junior college level and the research literacy at the undergraduate level. The National Vocational Education Reform Implementation Plan clearly states that vocational undergraduate education and regular undergraduate education are two equally important but distinct forms of undergraduate education. Medical and health-related vocational undergraduate talents specifically refer to high-level applied talents who can undertake complex technical work on the front line of clinical practice, in the health industry and public service institutions, and are oriented towards the fields of nursing, health management, rehabilitation therapy, and smart health and elderly care management in the big health sector. The training specifications should reflect the theoretical and research literacy at the undergraduate level, while also demonstrating the practical ability and job adaptability of professional attributes. This dual feature determines that vocational undergraduate talents in the field of medicine and health are not only distinct from ordinary undergraduate medical talents but also from medical and nursing talents at the junior college level. During the training process, it is necessary to achieve an organic integration of the undergraduate level and professional attributes in aspects such as professional foundation, professional core, professional expansion, and practical teaching, to avoid the polarization tendency of training specifications.

2.2. Theoretical basis

The theory of collaborative governance emphasizes the sharing of resources and responsibilities among multiple subjects under a common goal, providing a framework for the reconstruction of the governance

mechanism of industry-education integration [12-13]. In the context of industry-education integration, collaborative governance requires multiple entities such as the government, industries, schools, and enterprises to form common interests, joint actions, and common evaluations in talent cultivation, breaking through the limitations of a single entity running schools. This theory provides direct theoretical support for the design of the governance mechanism path in this research. In the design of governance mechanisms, the application of the theory of collaborative governance is reflected in: establishing a governance structure with the participation of multiple subjects, clarifying the rights, responsibilities and benefit distribution mechanisms of all parties, and ensuring substantive collaboration among all parties through institutionalized deliberation and decision-making mechanisms.

Human capital theory reveals the multiplier effect of healthy human capital on regional economic development and provides an economic basis for the training standards of vocational undergraduate talents [14]. This theory holds that health human capital is an important component of productivity. Increasing investment in the cultivation of vocational undergraduate talents in medical and health fields can significantly enhance the regional health service level and the competitiveness of the health industry. Under the background of the Healthy China strategy and the construction of the Hainan Free Trade Port, the human capital value of medical and health-related vocational undergraduate talents has become more prominent.

The theory of the type attributes of vocational education (proposed in the "National Vocational Education Reform Implementation Plan") clearly defines the positioning of vocational undergraduate education and regular undergraduate education as equally important but of different types[15-17], and requires that in the process of talent cultivation, the two deviations of subject-oriented tendency and skill-oriented tendency should be avoided. This theory provides direct theoretical guidance for the curriculum system path design and practical teaching path design of this research. The three theories complement each other and jointly support the path design for cultivating medical and health talents in vocational undergraduate programs from the perspective of industry-education integration. Among them, the collaborative governance theory focuses on the design of governance mechanisms involving multiple subjects, the human capital theory focuses on the economic basis for the specifications of talent cultivation, and the vocational education type attribute theory focuses on the type positioning and hierarchical positioning of talent cultivation. The organic combination of the three types of theories provides a systematic theoretical framework for the research. The integrated application of the three types of theories is reflected in the following aspects: In terms of governance mechanisms, the theory of collaborative governance is applied to design a collaborative mechanism involving multiple subjects; In terms of training specifications, the economic value of talent cultivation should be clearly defined by applying human capital theory. In terms of the curriculum system, the type attribute theory is applied to clarify the boundaries and integration between the undergraduate level and the occupational attributes.

3. The practical difficulties in cultivating medical and health talents in vocational undergraduate programs from the perspective of industry-education integration

3.1. Four prominent contradictions

One is the insufficient depth of integration between industry and education. Some vocational undergraduate colleges' cooperation with hospitals and enterprises remains at the level of signing agreements and plaques, lacking substantive coordination in key links such as the argumentation of training objectives, joint

development of courses, two-way flow of teaching staff, and joint implementation of evaluations. The phenomenon of numerous cooperation agreements but few joint training programs is quite common, and industrial demands have not been effectively transformed into systematic elements of training programs. The root cause lies in the fact that a stable mechanism for sharing benefits and risks has not yet been formed between schools and industries [6]. The substitutability of short-term cooperative behaviors restricts the depth of industry-education integration. Some cooperation, due to the lack of stable interest ties and institutional guarantees, is difficult to sustain in the long term, let alone evolve and upgrade to deep collaboration. In addition, the resource allocation mechanism for the integration of industry and education is not sound. Human resources, technical resources and information resources between schools and industries are difficult to flow effectively, which restricts the depth and breadth of the integration of industry and education.

The second issue is the unclear positioning at the undergraduate level. Some training programs simply follow the technical and skill-oriented goals of junior college, without clearly defining undergraduate-level ability elements such as clinical research, evidence-based decision-making, and technological innovation. Or simply transplant the disciplinary positioning of regular undergraduate programs, which is contrary to the type attribute of vocational undergraduate programs. The essence of this contradiction lies in the inaccurate grasp of the type and level characteristics of vocational undergraduate education, and the failure to form an ability gradient that is higher than that of junior colleges and distinct from regular undergraduate education [18-19]. In terms of curriculum design, it is manifested as a relatively low proportion of undergraduate-level courses and a relatively high proportion of junior college-level courses, or vice versa. In practical teaching, it is manifested as insufficient emphasis on clinical research and inadequate cultivation of students' evidence-based decision-making ability and technological innovation ability. Although some training programs have set up research method courses, the description of the objectives still follows the technical and skills-oriented approach at the junior college level, resulting in a disconnection between the courses and the objectives.

The third issue is that the adaptability of the curriculum system is relatively weak. New industry norms such as smart nursing, the ICF framework, and the national vocational skills standards for health management professionals have not been integrated in a timely manner [20]. The proportion of project-based and scenario-based teaching is relatively low. The implementation of the 1+X certificate system has been slow, with the dual-certificate holding rate being less than 40%. Some course content lags behind the technological frontiers of the industry and the job competency requirements, leaving graduates with insufficient career development potential. The normalization and institutionalization of the course content update mechanism need to be strengthened. In some institutions, the update of course content relies on the proactive actions of individual teachers, lacking systematic organization and institutional guarantees at the school level. As a result, the speed and quality of updates make it difficult to meet the demands of the rapid development of the industry. Although some courses have a mechanism for industry experts to participate, the regularity and substantive nature of their participation need to be improved, which has affected the synchronization of the course content with the industry's cutting-edge trends.

The fourth issue is that the practical teaching link is weak. The on-campus training bases are disconnected from the real clinical scenarios. Most on-the-job internships remain at the level of observation and simple operation, with insufficient comprehensive, design-oriented and innovative practical training links. Virtual simulation and real training have failed to form a closed loop of preheating, practical operation, and review. The clinical practice experience of the practical teaching faculty is insufficient, and the

assessment of practical teaching emphasizes results over processes, which restricts the cultivation of students' technical application ability and service ability in complex situations. Meanwhile, the sharing mechanism of practical teaching resources is not smooth, and the practical training resources between schools and hospitals (enterprises) are difficult to form effective coordination, which restricts the depth and breadth of practical teaching.

3.2. Domestic typical practices and implications

Jinhua Polytechnic University, relying on the Zhejiang Provincial Medical and Health Vocational Education Group, implements a three-in-one model of dual positions and dual appointments, order-based training, and industrial colleges. The nursing major has jointly established a clinical nursing college with Jinhua Central Hospital, achieving shared course responsibility, mutual appointment of teachers, and joint discussion on evaluation. The school and the hospital jointly formulate talent cultivation plans, jointly develop core courses, jointly implement practical teaching, and jointly conduct quality evaluations, forming a deeply collaborative governance mechanism. After the implementation of this model, both the employment quality and the job adaptation period of graduates are significantly better than those of the traditional training model. Its experience shows that the depth of industry-education integration depends on the systematic design and long-term persistence of the governance mechanism [21], and requires a stable core cooperative subject and continuous resource input.

Kingmed Diagnostics Group has joined hands with over ten vocational colleges to build a medical laboratory industry-education integration community, developing a modular system of school and enterprise courses. As a result, the proportion of students who are employed upon internship has significantly increased. Enterprises transform the latest testing technologies, quality control norms and laboratory management standards into teaching resources, while schools provide human resource reserves and technical service support for enterprises, thus forming a win-win ecosystem of industry-education integration for both schools and enterprises. Its experience shows that the effectiveness of industry-education integration depends on the substantive participation of enterprises [22]. It is necessary to organically combine the technological progress of enterprises with the talent cultivation of colleges and universities to form a stable mechanism for the transformation of technological resources.

The common enlightenment of the two types of typical practices lies in that the depth of industry-education integration depends on the mechanism design of a trinity of common interests, joint governance and joint evaluation, rather than the number of cooperation agreements. Only by establishing a stable mechanism for sharing benefits, a governance structure with clear rights and responsibilities, and a quality evaluation system with multi-party participation can the integration of industry and education move from superficial cooperation to in-depth collaboration. The inspirations from the two types of practices also include: a stable interest bond should be established, including mechanisms such as intellectual property sharing, distribution of technical service income, and ownership of joint training achievements, to safeguard the legitimate rights and interests of all parties. A long-term strategic framework for cooperation should be established to avoid short-term actions. A multi-party participation evaluation system should be established to ensure that the quality of training is effectively evaluated. The inspirations of the two types of practices for the cultivation of medical and health talents in vocational undergraduate programs also include: emphasis should be placed on the deep integration of industrial demands and undergraduate-level ability cultivation,

and the latest technologies, norms and standards of the industry should be transformed into undergraduate-level teaching resources. Emphasis should be placed on substantive coordination among multiple subjects to avoid formalistic cooperation. Emphasis should be placed on multi-party participation in quality evaluation, and an evaluation mechanism with in-depth participation of employers should be established. These inspirations can guide similar institutions to carry out the practice of cultivating medical and health talents in vocational undergraduate programs from the perspective of industry-education integration. It also provides a practical basis for the path design of the subsequent research in this paper and the proposal of the six-dimensional integration model of Hainan Vocational University of Science and Technology.

4. Path selection for cultivating medical and health talents in vocational undergraduate programs from the perspective of industry-education integration

4.1. Governance mechanism: Co-construction, co-governance and shared benefits

Establish a four-party collaborative governance structure involving the government, industries, schools and hospitals (enterprises). The government is responsible for policy supply and financial support, the industry for standard setting and demand forecasting, schools for training program design and teaching implementation, and hospitals (enterprises) for internship positions, clinical teaching staff and project-based case supply. At the university level, a committee for industry-education integration and a professional construction committee have been established. At the professional level, a dual-responsible system of professional heads and chief experts of hospitals (enterprises) has been set up, forming a three-level closed loop at the strategic, tactical and execution levels.

In terms of the operational mechanism, the boundaries of rights and responsibilities of all parties should be clearly defined, and a regular discussion and decision-making mechanism should be established. Through regular meetings on industry-education integration and professional construction seminars, the dynamic alignment of the training program with industrial demands should be ensured. In terms of assessment and evaluation, a performance evaluation system for industry-education integration should be established, incorporating factors such as the satisfaction of cooperative units, the quality of student internships, and the quality of graduate employment into the assessment indicators. In terms of benefit distribution, establish mechanisms for the ownership of intellectual property rights and the income from technical services, etc., to safeguard the legitimate rights and interests of all parties. In September 2026, five industry-education consortium projects of Hainan Vocational University of Science and Technology were selected as the second batch of city-level industry-education consortia in Hainan Province, covering key industries such as biomedicine and green health care, providing policy and platform support for the implementation of governance mechanisms. In terms of collaborative content, it has expanded from talent cultivation to multiple fields such as technology services, employment and entrepreneurship, and cultural inheritance, enhancing the breadth and depth of industry-education integration.

4.2. Curriculum system: Dual advancement at the undergraduate level and with vocational attributes

Reconstruct the curriculum system in accordance with the ability gradient that is higher than that of junior college and distinct from that of regular undergraduate programs [23]. The undergraduate-level course lines include “Evidence-Based Medicine”, “Clinical Research Methods”, “Smart Medical Technology”, etc.,

to cultivate research literacy and decision-making ability. The vocational attribute course line includes "Clinical Comprehensive Skills", "Comprehensive On-the-Job Training", etc., which strengthen the technical application and service capabilities in complex situations. The two lines are integrated through project-based courses (such as "Integrated Scheme Design for Chronic Disease Management" and "Smart Health Care Scheme Design", etc.), avoiding the phenomenon of two separate systems in the curriculum.

Simultaneously promote the integration of the 1+X certificate system with job positions, courses, competitions and certificates, and incorporate vocational skills level standards, industry competition regulations and professional qualification examination syllabi into the course content. A regular mechanism for updating course content has been established. Industry experts are organized to conduct comprehensive revisions every 2 to 3 years to ensure that the course content is in line with the latest industry trends. In terms of course implementation, project-based, scenario-based and inquiry-based teaching should be promoted to enhance the high-level, innovative and challenging nature of the courses. In terms of course evaluation, a course assessment system combining process evaluation and summative evaluation should be established, with a focus on examining students' comprehensive application ability and innovative practical ability. In terms of course resource construction, a course resource library jointly built by schools, colleges and enterprises should be established to achieve the co-construction and sharing of course resources.

4.3. Practical teaching: Collaboration between schools and colleges (enterprises) + integration of virtual and real

Build a four-level progressive practice platform consisting of on-campus training bases [24], affiliated hospitals, teaching hospitals and industrial colleges. The first level relies on the on-campus smart nursing simulation center, AI rehabilitation assessment center, intelligent care terminals, etc. to carry out basic skills training. The second level is to carry out bedside teaching through affiliated hospitals, and the proportion of bedside teaching for the nursing major has increased to over 30%. The third level conducts no less than 8 months of clinical rotation internship in teaching hospitals. The fourth level conducts comprehensive graduation training and project-based practice through industrial colleges.

Simultaneously promote the virtual preheating, real operation, and virtual review of the virtual-real integration training system, and organically connect virtual simulation with real training. In terms of practical teaching staff, part-time teachers with rich clinical or enterprise practical experience are hired to form a collaborative guidance mechanism with on-campus teachers. In the assessment of practical teaching, an evaluation system combining process-oriented assessment and summative assessment should be established, with a focus on examining students' technical application ability and service ability in complex situations. In terms of practical teaching resources, promote the sharing mechanism of training resources between schools and hospitals (enterprises) to enhance the efficiency of resource utilization. In terms of practical teaching safety, a student internship safety guarantee system should be established to provide necessary safety guarantees for students' internships. In terms of feedback on practical teaching, a quality feedback mechanism for practical teaching should be established. Through channels such as evaluations by employers and feedback from graduates, practical teaching should be continuously improved.

4.4. Teaching staff: Dual-qualified and dual-capable teachers + two-way mobility

First, a mandatory system for teachers' clinical practice should be established, requiring full-time teachers to accumulate no less than six months of practice in cooperative hospitals or enterprises every five years,

and linking clinical practice experience with professional title evaluation and appointment. Second, improve the mechanism for hospital (enterprise) experts to enter schools, establish a database of hospital (enterprise) experts, and clarify their teaching responsibilities such as practical course teaching and practical training guidance, as well as their salary and benefits. Third, explore the dual-mentor system, assigning each student both an on-campus mentor and a hospital (enterprise) mentor to form a collaborative guidance force both inside and outside the school. Fourth, senior nursing experts and clinical physicians from tertiary hospitals are appointed as part-time professors to deeply participate in the teaching of undergraduate-level courses and the guidance of comprehensive graduation training.

In the evaluation and appointment of professional titles, clinical practice experience, horizontal projects, technical services, etc. are included in the assessment indicators to guide teachers to enhance their practical and service capabilities. In the mutual employment of personnel between schools and enterprises, the calculation of teaching workload, salary and benefits, and assessment and evaluation mechanisms for part-time teachers should be clearly defined to stimulate their enthusiasm for teaching. In terms of teacher training, teachers are regularly organized to participate in clinical practice and enterprise practice training to update their professional knowledge and practical skills. In terms of scientific research support, teachers are encouraged to carry out applied research and transform research achievements into teaching resources. In terms of teacher evaluation, a diversified teacher evaluation system should be established, incorporating teaching quality, practical achievements, and social service effectiveness into the evaluation indicators to guide the all-round development of teachers. In the mutual employment of personnel between schools and enterprises, the workload calculation and salary benefits of part-time teachers should be clearly defined to stimulate their enthusiasm for teaching.

5. Practical exploration of six-dimensional integration at Hainan Vocational University of Science and Technology

In the reconstruction of the training programs for four vocational undergraduate programs, namely nursing, health management, rehabilitation therapy, and smart health and elderly care management, Hainan Vocational University of Science and Technology has explored and formed a six-dimensional integration model of positions, courses, competitions, certificates, innovation, and research [25]. The job positions are in line with the requirements for job capabilities (for the nursing position, the research was conducted at 5 top-tier hospitals in the province, involving 50 graduates and 50 head nurses, with a questionnaire recovery rate of 85.15%; for the health management position, 6 representative enterprises were visited). The term “curriculum” refers to the systematic transformation of job competency elements into a curriculum system. The competition refers to integrating the regulations of the National Vocational College Skills Competition and the Healthy China Initiative into the curriculum teaching. It is necessary to fully integrate the national vocational qualification standards such as nurse practice qualifications, health management professionals, and rehabilitation therapists into the course content. Innovation and entrepreneurship courses and project-based practices are offered to cultivate students’ innovative consciousness and entrepreneurial capabilities. The research institute aims to integrate undergraduate-level research competencies such as clinical research methods, evidence-based medicine, and technological innovation throughout the entire training process.

Through six-dimensional integration, the proportion of practical teaching in the four majors reached 66.10%, 62.09%, 65.60%, and 61.40%, respectively, significantly higher than the average level of similar

majors at the junior college level. The proportion of 40-week internship and bedside teaching in the nursing major has increased from 29.4% to over 30% [26]. The internship for the rehabilitation therapy major should be no less than 8 months, including no less than 6 months of bedside teaching in a secondary-level or higher hospital. In terms of the curriculum system, all four majors have added undergraduate-level courses such as evidence-based medicine, clinical research methods, and smart medical technology, achieving a gradient connection between undergraduate-level abilities and junior college-level practices. In terms of the teaching staff, the school has established a mandatory clinical practice system for teachers, hired senior nursing experts and clinical physicians from tertiary hospitals as part-time professors, and established a dual-mentor system. In terms of governance mechanisms, the school has established a committee for industry-education integration and issued a series of systems such as the "Management Measures for Industry-Education Integration Work", forming a governance closed loop.

The school has simultaneously issued a series of systems such as the "Implementation Plan for Deepening the Reform of Key Elements in Vocational Education Teaching" and the "Management Measures for Industry-Education Integration Work", and five projects have been selected as the second batch of provincial-level municipal-level industry-education consortia [27]. It promotes industry-education integration simultaneously in four dimensions: governance mechanism, curriculum system, practical teaching, and teaching staff. In the past three years, the school has undertaken 145 horizontal research projects, with service recipients covering government agencies, public institutions, and numerous enterprises both within and outside the province. Student Lu Lili was awarded the Outstanding Award for Grassroots Employment of College Graduates by the China Education Development Foundation in 2025. The practical exploration of the school's six-dimensional integration model shows that under the premise of deep coupling between industrial demands and training objectives, the undergraduate-level abilities and the junior college-level practices can form an effective gradient connection, which can provide a referenceable practical sample for the reform of medical and health talent cultivation in vocational undergraduate programs in similar institutions. The scalability of this model is reflected in the following aspects: First, the universality of the model elements - the core elements of the six-dimensional integration are applicable to the cultivation of medical and health talents in vocational undergraduate programs in different regions and levels [28]. The second is the flexibility of the model path - institutions can flexibly choose several dimensions from the six dimensions based on their own actual situations to focus on promoting. The third is the visibility of the model's effectiveness - the implementation effectiveness of the six-dimensional integration can be evaluated through quantitative indicators of the training program, the quality of graduates' employment, etc. The scalability of the three aspects determines that this model can be practiced in different types of institutions in a way that suits local conditions.

6. Conclusions and prospects

From the perspective of industry-education integration, the cultivation of medical and health talents in vocational undergraduate programs should be advanced simultaneously from four dimensions: governance mechanism, curriculum system, practical teaching, and faculty team, to form a collaborative governance pattern of co-construction, co-governance, and shared benefits. Among them, the governance mechanism is the prerequisite, the curriculum system is the core, practical teaching is the support, and the teaching staff is the key. The four aspects support each other and are indispensable. They need to be advanced in a

coordinated manner under the system design.

The practice of the six-dimensional integration model of Hainan Vocational University of Science and Technology shows that under the premise of deep coupling between industrial demands and training objectives, the ability at the undergraduate level and the practice at the junior college level can form an effective gradient connection, effectively improving the quality of talent cultivation and job adaptability. This model has reference significance for the reform of vocational undergraduate medical and health talent cultivation in similar institutions and can be promoted in different regions and institutions in a way that suits local conditions.

Future research can further track the career development trajectories of graduates and verify the long-term effectiveness of this model. At the same time, explore the application of emerging technologies such as artificial intelligence and big data in the cultivation of medical and health talents in vocational undergraduate programs, providing new technical support for the reform of talent cultivation. In addition, the differentiated design and localized practice of industry-education integration models in different regions are also important topics worthy of in-depth exploration. In the longer term, the cultivation of medical and health talents in vocational undergraduate programs needs to proactively adapt to the long-term demands of the Healthy China strategy and the construction of the Hainan Free Trade Port. It is necessary to continuously optimize core elements such as training objectives, curriculum systems, practical teaching, and faculty teams, and cultivate high-level applied medical and health talents with solid theoretical foundations, strong practical abilities, international perspectives, and innovative spirits. Provide strong talent support for the construction of a Healthy China and the Hainan Free Trade Port.

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