

Research on the Mechanism and Path of Deep Integration of Labor Education and Professional Education under the Background of Emerging Engineering Education

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Abstract: This paper aims to find out the mechanism and path of deep integration of labor education and professional education of private universities under the background of emerging engineering education, and provide a referenceable paradigm of the "five-aspect integration" and the cultivation of high-quality applied talents. Taking the School of Aviation and Intelligent manufacturing at Hankou University for the research object, this paper uses a combination of case analysis and empirical data to analyze its practical path of the "four in one" labor education and the internal mechanism of promoting the "five-aspect integration" through labor. The practice shows that the model can obviously improve the labor literacy, the professional skills, and the employability of the students. From 2022 to 2025, the number of awards at the level of province and above in the discipline competition recognized by the authorities of the whole country increased from 7 to 92, and the employment rate of the fresh graduate ranked the first in the university for two years in a row (both more than 96%). It is indicated that the deep integration of the labor education and the professional education can solve the pains of the cultivation of the talents in the new established engineering majors in private universities. Through the path of the cadre demonstration, the practical training integration, the combination of the campus life, and the social service expansion, the educational goal of the "five-aspect integration" is really realized.

Keywords: Emerging Engineering Education; Labor Education; Professional Education; Integration of Five Aspects; Applied Talents

1. Introduction

1.1 Overview

The construction of the emerging engineering education is not only a paradigm shift for the engineering education, but also a choice for the country to cope with the new round of scientific and technological revolution and industrial transformation. In this macro context, the current higher education is fully implementing the "five-aspect education" and "integration of five aspects", in order to train the compound talents with the solid capability of engineering and the profound humanistic literacy. As the hub in the "five-aspect" system, in view of the practical attribute of labor education and the value-guiding function, the labor education obviously has the potential to break the barrier of the moral, intellectual, physical and aesthetic education. But when this macro policy cascade down into the newly established engineering majors in private universities, its practice resistance is special.

Taking the School of Aviation and Intelligent Manufacturing at Hankou University for example, since the school is set up in 2021, it has successively set up the following emerging majors, such as Aircraft Design and Engineering, and Intelligent Manufacturing Engineering. Generally speaking, the objective conditions of these majors are short construction cycle and relatively little educational resources. By 2025, the enrollment scale is about 840 people. More importantly, influenced by the sources of students and the previous educational experiences of some students, the characteristic of these students, for instance, weak labor awareness, poor hands-on ability and lack of professional spirit, are existing. The traditional preaching-style labor education or the physical-oriented labor which has no relation with the professional scenarios can not only make not the students inner recognition, but can not support the cultivation demand of the emerging engineering education for applied talents well.

So the following question is, in the specific context of the newly established engineering majors in private university, how can we reconstruct the implementation path of labor education relying on the professional characteristic, and use it as the break-through to realize the true integration of five aspects? This is the core problem that this research is trying to answer.

1.2 Literature Review

With the in-depth promotion of the “five-aspect education” concept in recent years, the labor education has returned to the core agenda of talent cultivation in higher education, and it is an institutional basis to explore the deep integration of labor education and professional education. With the background of continuous deepening of emerging engineering education, how can the engineering colleges carry out labor education based on the professional characteristics and then carry out the integration of five-aspect education through the labor education has become an important problem in the current educational research and practice.

However, the implementation of the labor education of colleges and universities has not been smooth sailing. Li and Sun pointed out that the labor education is still facing the deep epistemological misunderstanding; some institutions simply interpret the labor education as the physical labor or the skill training, ignore the educative value of the labor education as the intermediary variable for the “five-aspect integration” [1]. Such cognition directly causes the formalistic tendency in practice - Li and Han, by the investigation of a few universities, find out that in general, the practice course of the labor education suffer from the incomplete system, the weak teaching staff, and the separation from the professional teaching, it still stays in the “activity-based” level, and not real to integrate into the core aspects of the cultivation of talents [2]. Jia et al., taking the application oriented universities as the research objects, find out the practical difficulty in the process of integration, for example, the incomplete mechanisms, the indifferent attitude, and the insufficient teaching staff. They argue that the two do not have the effective connection in the aspect of the goal setting, the content selection, and the evaluation standard [3]. In the empirical research at the engineering colleges, the Liu et al. also find out that the labor education in the

major of engineering runs independent of the professional training; though the students take the way of the skill improving during the internship, the cultivation of the labor value is obviously absent [4]. Xu analyzed the roots of the separation from the point of view of the collaborative education, he points out that the labor education and the professional education in the current colleges have not yet formed the effective collaborative mechanism in the organization management, the resource allocation, and the structure of the teaching staff [5].

To solve these difficulties, people in the academic community have started to consider the possibility of labor education to cooperate with professional education at the mechanism level. For example, Liu and Feng with practice in the School of Intelligent Manufacturing and Aeronautics at Zhuhai College of Science and Technology built the “value guidance-skill cultivation-quality improvement” three-in-one collaborative education mechanism. They put forward a two-way interactive mechanism that carries on the labor value education through the engineering training project, and feeds back to the engineering innovation ability cultivation through the labor practice, and promote the collaborative education by the strategy like the school-enterprise dual-mentor system and the labor quality evaluation [6]. This research is also an operable mechanism model of the deep integration of the labor education and the professional education in engineering colleges. The key concept of this study is in breaking the pattern of the formal separation and goal disconnection between the labor education and the engineering training in the traditional mode.

In the aspect of the emerging engineering education, the integration paths of labor education and professional education have also shown the orientation of professional characteristics. For example, Duan et al. take the major of CNC technology as the example, studying the characteristic education path of “labor + specialty”, that is, integrating the labor spirit, craftsman consciousness and professional quality into the practical training of the professional courses, making the students can understand the value of labor while master the skill of CNC machining [7]. Ding from the point of new quality of productive forces, put forward that the integration of labor education and professional education in the higher vocational

colleges must respond to the new requirements for the quality of talents posed by the transformation of industry, and put forward the ways such as “the real project driven” and “digital twin practical training” to achieve intelligent upgrade of the labor education [8]. Ren et al. take the professional group of intelligent manufacturing as the example, put forward the integration paths from four dimensions: the reconstruction of the goal of the labor education, the integration of the content of curriculum, the optimization of the training process and the co-construction of the teaching staff, it is pointed out that the labor education should run through the whole process of the cultivation of intelligent manufacturing talents [9]. Zhou extended the vision to the overall framework of the emerging engineering education, put forward that the labor education should adapt the “student-centered, output-oriented” educational philosophy, achieved the organic unity of the labor education and the intellectual education by the project based learning and interdisciplinary practice [10].

The iterative upgrading of technical platform has given new support conditions for the integration of labor education and professional education. In the study of Tian et al, the authors designed an intelligent manufacturing basic practical training platform based on the technology of digital twin, which is virtual simulation and physical operation combined, so that the students can complete the full process of labor practice from the process design to the manufacturing in the digital environment. The training model of virtual-real combination can not only reduce the teaching cost, but also extend the scenario boundary of labor education [11]. In the study of Yang and Ma, they introduced the OBE (Outcome-Based Education) concept from the perspective of teaching design, from which the authors show that the labor education courses should be reverse-designed according to the students’ final acquired labor literacy and engineering capabilities, that is, every teaching link must have the measurement of learning outcome [12]. These studies show that the technology empowerment and concept renewal are promoting labor education to transform from “experience-driven” to “data-driven” together.

The deep integration of the labor education and professional education provides an external institutional environment for the industry-education integration. Yu et al. analyzed the

operational logic of industry-education integration from the perspective of top-level design, suggested to construct the talent training bases through the way of "government guidance, school-enterprise co-construction and project traction" to transform enterprises' real production tasks into the teaching carrier of the labor education [13]. Such way of "moving classrooms into work shops" can make the labor education out of the limit of the campus environment; when the students take part in the actual enterprise's projects, not only they can exercise their professional skill but also they know the professional responsibility and the social division of labor through the real labor relation.

The systematic reconstruction of curriculum systems is the core link for work of incorporating labor education into professional education. Fu proposed to construct a three level curriculum system of the “general labor courses + professional labor courses + innovative labor practice, so that the labor education, which is just an independent compulsory module at present, can be lifted to be an element in the structure, permeated in the process of the cultivation of talents [14]. From the perspective of the practical paths, Wang and Di paid more attention to the fact that the implementation of labor education needs the diversified practical platform, such as the training base on campus, the joint laboratory of school and enterprise, the social service station, to form the education pattern of “in-the-class and out-of-the-class integrated [15].

The research integration of labor education and innovation-entrepreneurship education is also an important growth area in recent research. Ou and Huang discussed the cooperative development of labor education and innovation-entrepreneurship education in the context of new medical science, and they think that the two are natural compatible in value orientation (cultivate responsibility), capability goals (enhance the ability of problem solving) and practical carriers (real projects) [16]. Taking the computer major as a case, Wang designed an implementation path of "embedding labor education into innovation-entrepreneurship projects", in which students cultivate the thinking of innovation through the labor of developing software and the maintenance of system [17]. Tan et al. proposed from a more macro perspective that the integration of labor education and innovation-

entrepreneurship education in colleges needs to break the barrier of the department and establish the mechanism of cross college curriculum co-construction and the system of credit mutual recognition [18]. Li pointed out that this integration can not be at the level of juxtaposition of courses, but it should achieve deep coupling in the teaching goal, content system and assessment standard [19]. Wu and Qin analyzed the internal relationship between labor education and innovation-entrepreneurship education using "isomorphic symbiosis" theory, pointed out that the two share the essential attribute of "practice based education" and should form a sense of symbiosis in talent cultivation ecosystem [20]. Zhao, Jin and Liu discussed specific strategies for integrating labor education and innovation-entrepreneurship education from the views of curriculum construction and collaborative education system [21-23].

The aesthetic dimension of labor education has also been paid attention in the recent research. Bai and Xiong studied the labor courses from the angle of aesthetics. They maintain that the labor process itself has rich aesthetic resources, the design of products, the pursuit of excellence in the craft of the labor, and the aesthetic quality of the labor result can all be taken as the entry for the aesthetic education [24]. This "cultivating aesthetics through labor" gives new angles of interpretation to five-aspect integration.

Teaching reform in professional courses is also the micro-foundation for the integration of labor education into engineering education. Meng et al. discussed the connection point between labor education and professional teaching in the course of electrical machinery. The practical connection points such as the disassembling and winding of motor were changed into specific scenes of labor education, the students could learn the professional ability and a labor literacy at the same time by learning by doing [25]. The international comparative research is the external references to understand the integration of industry-education. Huang and Halasz do the comparative research of the policy of industry-university cooperation of EU and Chinese, they find that the cooperation of China provides "deep integration" and is made by the modern industrial colleges and future technology colleges, the cooperation of EU prefers bottom up collaborative innovation by the mode of the "Knowledge and Innovation Communities", the

two modes are the complementary value orientation [26]. This research means that the integration of the labor education and of the professional education needs both the top level of institutional design and the stimulation of the innovative vitality in this level of the grassroots of the teaching organization.

Synthesizing the existing research, we can find that the deep integration of labor education and professional education has not only passed the stage of conceptual advocacy, but also developed to the substantive stages of mechanism construction and path exploration. The authors of the article, Liu and Wei, given the theory annotation for this trend, which is that strengthening the labor education of colleges under the framework of "five-aspect" is not only policy requirements, but also the internal logic for promoting the all-around development of students and responding to the social requirements of talents [27]. However, there are still several aspects of the current research need to be deepened. First, most the research is on the higher vocational colleges or application-oriented undergraduate institutions, and in the systematic research of private universities on the aviation and intelligent manufacturing are relatively few; Second, the discussion of the integration paths of most are still in the curriculum level, and there is not enough attention to the support conditions such as the building of the teaching staff, institutional reform and the cultivation of the cultural environment; Third, the evaluation research is relatively lagging behind, and how to construct a whole evaluation system that is balanced between the labor literacy and the professional capabilities is an urgent question to be solved. We can further expand the research in the future in these aspects, especially we need to explore the replicable models of deep integration of labor education and professional education that matched the characteristics and resource endowments of private universities.

2. Methods

2.1 Case Background and Student Analysis

The School of Aviation and Intelligent Manufacturing at Hankou University is selected as an empirical case in this study. Founded in 2021, the school has three majors of undergraduate which are Aircraft Design and Engineering, Intelligent Manufacturing

Engineering and Mechatronics Engineering, and one junior college major of Flight Attendant. In 2025, the total enrollment is 840 students. It is a newly set up engineering school in a private university, and the major construction is at the stage of transferring from scale expansion to connotative development.

We have found through long-term teaching observation and student situation survey that the three-dimensional pain point of labor literacy among students in newly established engineering majors is as follows: the first one is the weak labor awareness, some students are with the fear-of-difficulty mentality that is the unwillingness to do small tasks and not daring to do big ones; the second one is the lack of labor skills, the space of the practical exercise is squeezed by the heavy of academic pressure, the students are at a loss if they face the real engineering problems; the third one is the lack of professional spirit, the cognition of labor value is limited in the material reward only, there is no internalized recognition of the craftsman spirit and social responsibility. If not being intervened, they will directly restrict the cultivation quality of the applied engineering talents. Based on this, the school has set up the overall reform approach guided by the scientific view of labor, where the labor education is regarded as the breakthrough point for the integration of the five aspects.

2.2 Design of “Four-in-One” Practical Path of Labor Education

In order to solve the above dilemmas, the school has given up the traditional “preaching-style” and “physical-oriented” labor education models. Based on the professional characteristics of aviation and intelligent manufacturing, it has built a “four-in-one” practical path of labor education. The design of the path emphasizes that making labor a bridge that connects the cognition and action of the students in the real, complex and even extreme situation.

Role Modeling and Cognitive Reshaping. The starting point of labor education is to break through students’ cognitive barriers, and the most effective education is often from the “teaching without words”. In July 2024, some experimental equipment was in urgent need of relocation. At that time, there were no external logistics platforms that accepted the order, and the high temperature of Wuhan was extreme 40 degrees. Facing with the dilemma, with the leading cadres including the executive vice dean,

vice dean and the department directors, brought their own forklift, carried the equipment by hand and shoulder, and sweat through their clothes, completed the re-location with high efficiency. At the end of the same year, with the commissioning of the newly built Building 6, the school launched the laboratory relocation project across the building. In the newly built hydraulic, pneumatic, CNC machining and intelligent manufacturing digital twin laboratories, all full time teachers cleaned and debugged the equipment at the end of the semester personally. The action logic is “the cadres take the leading and the teachers set an example”. This action logic produced a strong mirror effect. After that, the students transform from the initial bystanders, to the action participants, spontaneously organize the laboratory cleanup of the time. This process indicates that the actions speak louder than words. The personal practice of the educator is the primary driving force for reshaping students’ labor cognition and stimulate their internal motivation.

Real Scenarios and Will Tempering. When the labor scenarios go on from campus to enterprise workshops, the labor education is deep coupled with the professional practical training. In September 2024, the students of three undergraduate majors of the 2022 cohort go to enterprises for the production internships. The learning workplace, Wuhan, meets abnormally continuous high temperatures which has not been in the decades. The enterprise has put ice blocks and has high-power fans, but the workshop is still unbearably hot. There is even the fear-of-difficulty mentality, but even the behavior of some students asking for leave to retreat when first arriving at the enterprise. The school teachers and the enterprise mentors act quickly and guide the students to face the challenge through the psychological counseling and the demonstration on the spot. The students complete the assembly of the components and the equipment debugging for the weeks. The high-intensity physical consumption makes the students deeply feeling that we must be powerful. Some students who have bad living habits made up their minds to change their bad living. It greatly promotes physical education as a great side effect. Meanwhile, in the mapping and design links, the students draw the sketches of the component during the break, perceiving the precise beauty of industry in the cold machinery, achieving the natural generation of the

intellectual and aesthetic education.

Emergency Response and Responsibility Internalization. In addition to professional training, sudden public events also are a very vivid classroom of labor education. In early of 2024, the area of Wuhan met rare extreme weather, which includes freezing rain, blizzards, and graupel, the tree which were planted all over the campus fell to the ground and some branches are broken. When the weather is warmer, the school organized the students to clean up for the campus quickly. In the process of clearing the ice and snow and moving the broken branch, the students not only make the campus is clean and tidy, in the meantime, in the sweat and together, they also feel the warmth of the strength of the collective. This model is close to the labor education and the reality of the campus life, turn the abstract of "social responsibility" to the concrete of "ownership consciousness", make the moral education take root in real dedication. Social Service and Aesthetic Reciprocity. Social service provides a broader value anchor for labor education. The school has organized teachers and students many times to go deep to Wuhan Hongshan Middle School to carry out the activities of drone science popularization, popularize the knowledge of aero space and do the flight performance. At the unveiling ceremony of the jointly built "Hankou University Aviation Science Popularization

Practice Base" in November 2025, the university students deeply feel the social value of professional knowledge of their own at the bright eyes and the enthusiastic clapping of middle school students. There is a natural generation of the dedication spirit to be pillars of society. More ingeniously, during the science popularization interaction, the art wall painted by middle school students touches the university students present in reverse. This is the so-called "reverse education" between the two ages. When university students appreciate the innocent beauty, they complete the purification of their own souls and the sublimation of aesthetic realms. This is a closed-loop of two way interaction between aesthetic and moral education.

2.3 Mechanism Model Construction for Promoting "Five-Aspect Integration" through Labor

By the exploration of the above practical paths, the school has gradually figured out the intermediary mechanism of the labor education in the "integration of five aspects." Labor education is not the isolated fifth aspect, but rather as a core catalyst to promote the coordinated development of the moral, intellectual, physical and aesthetic education, as shown in Figure 1.

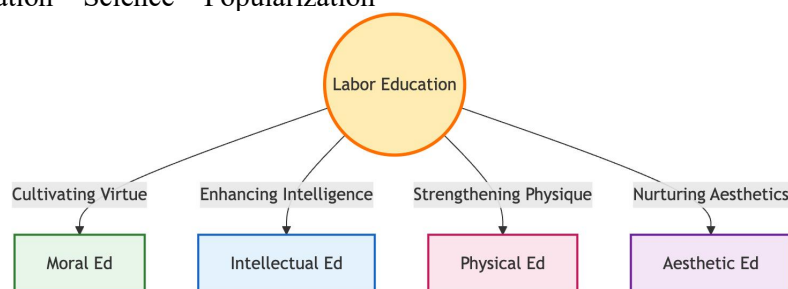


Figure 1. Mechanism Model of Labor Education Driving the "Integration of Five Aspects"

In this mechanism model, labor education in the form of specific practical scenarios can turn the abstract educational goal into what can be perceived and operated in this paper. What is more, in Table 1, this paper sorts out the

mapping relationship between the four-in-one paths and the integration dimensions of the five aspects, which can be used as the analysis of the subsequent effect evaluation.

Table 1. Mapping Relationship between "Four-in-One" Labor Education Paths and "Five-Aspect Integration"

Practical Path	Core Scenario	Integration Dimensions	Mapping of Educational Effectiveness
Role Modeling	Laboratory relocation and cleanup	Moral, Intellectual	Stimulating internal motivation, reshaping labor cognition, cultivating rigorous style
Training Integration	Production internship in high-temperature environment	Intellectual, Physical, Aesthetic	Tempering professional skills, strengthening physique, perceiving industrial beauty

Life Combination	Post-disaster cleanup in extreme weather	Moral	Cultivating ownership consciousness, enhancing collective cohesion and social responsibility
Social Service	Middle school drone science popularization	Moral, Aesthetic	Nurturing dedication spirit, achieving cross-generational aesthetic reciprocity and soul purification

3. Results

Under the joint action of the "four-in-one" practical path of labor education and the "five-aspect integration" mechanism, the educational quality of the School of Aviation and Intelligent Manufacturing at Hankou University has a leapfrog development from 2022 to 2025. What we get is not the linear development of a single indicator, but the result of the labor literacy, the professional skills and the professional spirit to evolve in synergy. We trace and analyse the core school-running data of the school in the past three years, and we can really see the tremendous efficacy released by labor education as a "catalyst".

3.1 Improvement of Students' Comprehensive Quality and Labor Literacy

The most direct effect of labor education is reflected in the reshaping of students' physical and mental states and the optimization of the campus ecology. In the long-term teaching observations, we have found that the students in the newly established engineering majors often give up physical exercise under the pressure of study and are likely to be the fear-of-difficulty mentality when facing difficulties. However, with the normalization of the high intensity, real-scenario labor projects, such as the production internship of fighting high temperatures, post-disaster campus cleanups after the extreme weather, the physical fitness and will power of students has been tempered. The data shows that in recent years, the pass rate of students' physical health test has kept above 90% for years. Behind the data is the spontaneous upsurge of exercise which is formed after the students deeply realized in real labor that a strong physique is the basic literacy of an engineer.

Meanwhile, the sense of collective belonging and achievement brought by labor education is directly reflected in the teaching evaluation system. For the past three years, the comprehensive satisfaction rate of college students with education, teaching and campus life also continue to keep above 92%. In the

collective labor of such as relocating the laboratories and clearing the broken branches on campus, the students are transformed from the initial bystanders to builders. Class cohesion is greatly enhanced. This kind of inside-out transformation of mental outlook proves the deep integration of labor education in the dimensions of moral and physical education, and solved the pain point of weak labor awareness among the students in private universities.

3.2 Breakthroughs in Professional Skills and Innovation-Entrepreneurship Abilities

If the enhancement of physique and the tempering of will are the "implicit" results of the labor education, then the breakthrough of professional skills and the explosion of the innovation ability are its most intuitive "explicit" results. Labor education of the background of the emerging engineering education is not in the least a simple physical consumption, but a process of solving a large number of engineering problems relying on the platforms of the digital twin laboratory, the school-enterprise joint training base. If the students personally participate in the debugging of the hydraulic and the pneumatic equipment and the assembly of the intelligent manufacturing production line. The sweat will turn the theory into the engineering intuition.

This model of "learning by doing and creating by learning" has greatly stimulated students' innovative potential. As shown in Table 2, the number of provincial-level and above awards in national college student discipline competitions obtained by students of the school has shown an astonishing exponential growth. It was 7 in 2022, and leaped to 16 in 2023, and reached 43 in 2024 and 92 in 2025, respectively.

Table 2. Awards in Discipline Competitions at Provincial Level and Above for College Students from 2022 to 2025

Year	Number of Competition Awards	Year-on-Year Growth Rate
2022	7	-
2023	16	129%
2024	43	169%
2025	92	114%

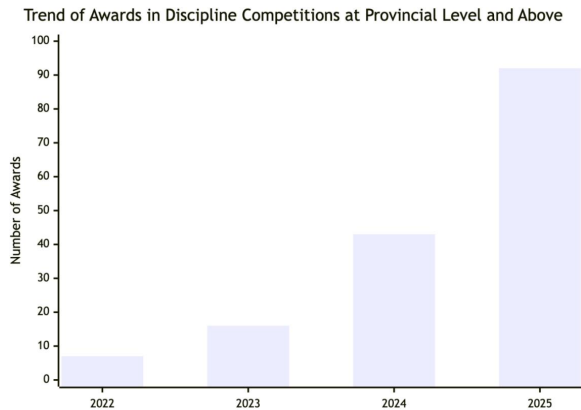


Figure 2. Growth Trend Chart of the Number of Awards in Discipline Competitions for College Students

There is clear logical chain behind this set of data: real labor scenarios make students have the acuity to find out the pain points of engineering, the hardworking labor spirit backs them up to stay up late for so many nights to debug the equipment. The deep coupling of the labor education to intellectual education and innovation-entrepreneurship education, the students no longer participate in the competition for the credits but is to innovate for solving the real problem in the actual production, its growth trend as shown in Figure 2.

3.3 Enhancement of Employment Competitiveness and Social Recognition

The ultimate exit of higher education is employment. Therefore, the evaluation by employers of the graduates is a “market vote” on how the school cultivates talents. In the employment environment in the present time, in addition to the professional skills of the graduates, enterprises pay more attention to whether the graduates have the professional spirit of being down-to-earth and have strong stress resistance. This is exactly the core trait that the labor education of the School of Aviation and Intelligent Manufacture cultivates. The school has made enterprises’ real production tasks become the teaching carriers of labor education relying on the supply-demand docking employment education projects. It realizes the idea of moving classrooms into workshops. Meanwhile, the work style that not fearing hardship or difficulties shown by the students during enterprise internships has made them get an extremely high workplace reputation. As shown in table 3, the employment rate of fresh graduates from the school climbed all the way from 70.9% in 2022 (it is in 9th rank in the

university) to 91.1% in 2023 (it is in 4th rank in the university), and keeps above 96% for two consecutive years in 2024 and 2025 and it is firmly in the first rank in the university.

Table 3. Employment Rate and Ranking of Fresh Graduates from the School from 2022 to 2025

Year	Total Number of Graduates	Employment Rate	University Ranking
2022	110	70.9%	9
2023	124	91.1%	4
2024	136	96.2%	1
2025	180	96.7%	1

This counterattack is not by any means accidental. From ranking ninth in the university to topping the list for two consecutive years, it verifies the effectiveness of the “value guidance-skill cultivation-quality improvement” collaborative education framework proposed by Liu and Feng in private universities [6]. If the labor education is really in the professional bloodline, what is cultivated are not any more the “greenhouse flowers” which have high ambitions but low abilities, but the high quality applied engineers who can go down, stay and be used. The employment competitiveness forged by the background color of labor is exactly the optimal solution for the talent cultivation in the emerging engineering education.

4. Conclusions

Let us review the main findings of this study. Facing the double pressures of the resource constraint and the student characteristics, the newly established engineering majors in private universities are not at the end of the road of performing passive adaptation. On the contrary, they are capable of completely reconstructing the implementation logic of the labor education and transforming it into the powerful engine of the “integration of five aspects”. The practice of the School of Aviation and Intelligent Manufacturing at Hankou University proved that when the labor education is no more wrapped in the coat of “formalistic” and is really got into the high temperature workshop internship, the campus clean up after the extreme weather, the cross stage science popularization services, the labor education is no longer the lonely “fifth aspect” but the “core catalyst” that activated the moral, intellectual, physical and aesthetic education.

Data does not lie. From the physical health test pass rate always more than 90%, to the

discipline competition awards increase from 7 to 92, and then to the fresh graduate employment rate top the university with the absolute advantage more than 96% for two years in a row, the essence behind this series of hardcore indicators is the outward expression of the synergistic evolution of the students labor spirit, engineering capability, and professional literacy. The mechanism of cultivating virtue, intelligence, physique, and aesthetics through labor provides a replicable and promotable operational paradigm for similar private universities to solve the pain points of the applied talent cultivation.

But the exploration of any educational model can not happen in a day. We have also paid attention to the shortcoming of the current mechanism in the practice process. On one hand, the evaluation system for labor literacy still is more in qualitative description, no dynamic collection and quantitative analysis of the data of students' behavior in real labor situation. On the other hand, the width of social service and school-enterprise collaboration still can expand, and the complexity of some labor situation is not enough to match the ability request of emerging engineering education for solve the "complex engineering problem".

Looking to the future, the deep integration of labor education and professional education needs to go from digitalization and ecologicalization. Depending on the digital twin and artificial intelligence technology to build companion-based digital portrait of labor literacy will be the key breakthrough for accomplishing the precise evaluation. At the same time, breaking the campus wall further, and transforming enterprises real R&D pain points and social grassroots governance needs into labor education project is the only way to cultivate new engineering talents with both the nation sentiments and excellent engineering capabilities in a larger ecosystem.

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