International Journal of Research in Education Humanities and Commerce

Volume 06, Issue 03 "May - June 2025"

ISSN 2583-0333

A PRACTICAL EXPLORATION OF COLLABORATIVE LABOR EDUCATION TALENT DEVELOPMENT BETWEEN NORMAL UNIVERSITIES AND PRIMARY AND SECONDARY SCHOOLS

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https://doi.org/10.37602/IJREHC.2025.6321

ABSTRACT

In view of the existing problems in labor education in universities and primary and secondary schools, this study is based on the empirical investigation of 10 primary and secondary schools and 3 normal universities in Southwest China, combined with case analysis, to explore the practical path of collaborative promotion of labor education between normal universities and primary and secondary schools. The study found that the current situation of cooperation between the two sides has some problems, such as the absence of coordination mechanism, the dislocation of resource supply and demand, the deviation of value identification, etc. Typical cases show that the innovative practice of cross-border integration of courses, resource network construction and technology empowerment can effectively improve the effectiveness of collaborative labor education, but it is necessary to further solve the challenges of resource structural contradictions, lack of long-term effectiveness of collaborative mechanisms, etc. The research further proposes the practice mechanism, dynamic system and "five-dimensional" optimization path of multi-party collaborative labor education with normal universities and primary and secondary schools as the core subject, so as to form a collaborative ecology of "university leading - primary and secondary school practice - social participation".

Keywords: Normal universities; Primary and secondary schools; Labor education; Collaborative talent development; Practical exploration

1.0 INTRODUCTION

Labor education is one of the educational contents that combines moral, intellectual, physical, aesthetic, and labor education for students. It is an important part of the socialist education system with Chinese characteristics and directly determines the labor spirit, labor value orientation, and labor skill level of socialist builders and successors.With the release of many national and local policy documents such as The Program for Improving Civic Morality in the New Era and A guideline on hardworking spirit education, the importance of labor education has become increasingly prominent and has received widespread attention from all sectors of society[i].

Schools are the main front to implement labor education. However, at present, the labor education resources in primary and secondary schools are not rich, the education mode is single, and there is a lack of practice platform, which leads to the neglect of the unique

educational value of labor to a certain extent, and labor education is being diluted and weakened [ii]. Similarly, universities do not pay enough attention to labor education in talent cultivation, the role of labor education is marginalized and virtual, and the rich labor education resources are largely idle [iii].

Therefore, for labor education, how should universities and primary and secondary schools carry out collaborative education, promote effective connection through complementary advantages of both sides, and then promote the integration of labor education in universities, primary and secondary schools, so as to finally realize the high-quality development of labor education and two-way education?

2.0 THE CURRENT SITUATION AND ANALYSIS OF COLLABORATIVE LABOR EDUCATION TALENT DEVELOPMENT

2.1 Current Situation of Collaborative Labor Education

This study uses stratified samples to conduct an empirical survey on 10 primary and secondary schools and 3 normal universities in Southwest China. A total of 390 questionnaires were distributed through the questionnaire star (363 were effectively collected, and the effective rate was 93.1%). 28 education administrators, teachers, students and parents' representatives were interviewed in depth. Through the research and analysis of the data, it is found that the current situation of cooperative education between normal universities and primary and secondary schools is mainly summarized into three aspects.

2.1.1 University Participation and Resource Supply

1. University participation. According to the survey data, all three normal universities have established temporary cooperation mechanisms with primary and secondary schools, while only one university have included labor education in regular cooperation projects. In terms of teacher participation, about 35.8% of university teachers have participated in the design of labor education courses in primary and secondary schools, and most of them are majoring in physical education, education and ideological and political education, while most of the teachers' current cooperation is still in the stage of "lecture guidance". In the Pre-service teacher training stage, about 76.3% of normal students have not received systematic professional training or practical training on the teaching method of labor education, which fully confirms that the self-evaluation score of primary and secondary school teachers in the practical skills of labor education is only 3.3 points (5 points). In addition, normal universities carry out labor education mainly in short-term activities, such as "labor education near campus activities" (64.7%) and academic lectures (27.7%), while the systematic open school-based curriculum of labor education only accounts for 7.3%.

2. Resource supply. According to the survey data, the average number of opening laboratories and popular science bases in Colleges and universities is 4.1 times a year, covering less than 15% of students. However, the data show that about 93.5% of primary and secondary school teachers recognize the important value of university laboratory resources for improving students' scientific literacy and scientific research ability, and about 88.6% of primary and secondary school students hope to have more opportunities to participate in university practical activities.

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2.1.2 Current Situation of Labor Education in Primary and Secondary Schools

1. Current situation of curriculum implementation. The survey data showed that 8 (80%) primary and secondary schools did not offer independent labor education courses in the true sense, and 7 (70%) schools equated labor education courses with letting students participate in the activity of "cleaning and cleaning the campus". Data show that the proportion of full-time teachers in labor education is only 11.9%, and 75.0% of labor courses are held by head teachers. In the labor education practice activities organized by primary and secondary schools, the average participation rate of students is 76.6%, but the sustainability is not enough. For example, only about 40.2% of students participated in more than three activities.

2. Resource requirements. The survey data shows that the three most urgent supports for primary and secondary schools are professional teacher training (89.3%), curriculum development guidance (77.6%) and joint practice (69.7%). However, in the current cooperation, only 8 (40%) primary and secondary schools have received the support of college curriculum development, and only 6 (30%) schools have used the practice base of colleges and universities to carry out the practice of labor education curriculum.

2.1.3 Effectiveness of Collaborative Labor Education

1. Student development. The survey data shows that the proportion of primary and secondary school students who participate in the collaborative project to master labor skills is 78.5%, which is significantly higher than that of students who do not participate in the project (42.6%), but the improvement of practical skills is limited. For example, about 30% of students have basic handicraft or agricultural skills. At the same time, the questionnaire shows that students' recognition of labor values has significantly improved, and the proportion of students' recognition of labor creating value has increased from 47.5% to 71.9%.

2. Teacher development. The data shows that 67.2% of the primary and secondary school teachers who participate in the cooperation think that their professional ability has been improved, but 58.5% of the teachers still think that an university guidance is lack of sustainability. On the other hand, the actual feedback rate of teachers in normal colleges and universities in the cooperation is only 31.6%, which also limits the effectiveness of teaching reform in Colleges and universities.

2.2 Problem Analysis

In view of the above situation, it can be summarized as the following four aspects.

1. Absence of collaborative education mechanism. According to the survey data, two universities and primary and secondary schools lack long-term formal cooperation agreements, and the number of agreements with a cooperation cycle shorter than six months accounts for 90%, which leads to fragmentation, inefficiency and unsustainability of resource investment.

2. Dislocation of resource supply and demand. The advantageous disciplines and resources of higher normal colleges, such as digital physics and chemistry laboratories and practice bases, do not match the needs of primary and secondary schools (such as labor education content, labor skills training, etc.).

3. There is deviation in the recognition degree of labor education value. The survey data shows that 43.6% of university teachers believe that labor education belongs to the category of basic education. How to carry out labor education well is a matter for primary and secondary schools, and universities are only moderately involved. About 51.7% of primary and secondary school teachers only focus on completing the target tasks set by the education department.

4. The collaboration between family, school and society is not strong. Through interviews and statistical analysis, the proportion of students' parents actively cooperating with the school to participate in labor education is as low as about 25%, and the participation rate of social resources (such as enterprises, craftsmen, communities, etc.) is less than 10%.

3.0 CASES AND ANALYSIS OF COLLABORATIVE LABOR EDUCATION TALENT DEVELOPMENT

3.1 Innovation Practice of Collaborative Labor Education

For a long time, the normal university X has cooperated deeply with many primary and secondary schools in the city N, and has established a collaborative system of labor education with regional characteristics through innovative practices such as co-construction of courses, sharing of practice bases, and collaborative training of teachers.

From November 29 to 30, 2023, the middle school C in the city N organized more than 300 junior high school students to participate in a two-day comprehensive practical research and learning activity in the comprehensive research and learning practice base of the normal university X. This comprehensive practical study includes

8 comprehensive practical courses, including “Campus Culture Trip-Approaching Hometown Celebrities” developed by the School of Political Science and Public Administration, “Emei Wushu” developed by the School of Physical Education, “Ceramic Art Design“ developed by the School of Zhang Daqian Academy of Fine Arts, “The Story of Flowers in the Water Goldfish” developed by the School of Life Sciences, “Magic Stone” developed by the school of Geography and Resource Science, “Beginner Robot” developed by the School of Artificial Intelligence, “Music Appreciation” developed by the Music College, and “Mind Map” developed by the School of Educational Sciences. The activity was affirmed by the deputy director of the Education Bureau of the city N on the spot and believed a replicable collaborative model of "university + primary and secondary school" can be formed.

On March 21, 2024, the normal university X organized a one-day comprehensive research and learning practice activity, with 260 students from grade 9 of the junior middle school D in the city N attending. In the process of comprehensive research and learning practice activities, the cooperative form of "Interdisciplinary Course Co construction+Double Teacher Guidance" is adopted. By integrating the ceramic art creation of the School of Zhang Daqian Academy of Fine Arts and the robot programming course of the School of Artificial Intelligence, adhering to the concept of "students' operation experience first, supplemented by the guidance of the lecturer and the student teaching assistant team", it highlights the team nature, autonomy of the activity subject and the educational, comprehensive, practical and public welfare nature of the activity content.

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3.2 Cases Analysis

1. The cases shows three innovative characteristics in the cooperation between universities and primary and secondary schools. The first is the cross-border integration of the curriculum system. The normal university X breaks through the limitations of traditional disciplines, better integrates relevant disciplines and courses into practical teaching, and realizes the organic connection between labor education and scientific and technological innovation. The second is the three-dimensional construction of resource network. The normal university X focuses on sinking scientific research resources, and cooperates with local governments, enterprises and communities to form a resource supply network, forming a closed loop of "teaching - practice - industry". The third is the technological empowerment of the evaluation mechanism. Through blockchain technology, students' labor files are established to enable students' growth to achieve process data traceability. The practice of the normal university X shows that the close cooperation between universities and primary and secondary schools can effectively solve the "superficial dilemma" of labor education. Through the three-dimensional drive of policy guidance, resource integration and technology empowerment, labor education has shifted from a single curriculum innovation to the reconstruction of teaching ecology, providing a new mode for the cultivation of compound talents in the new era.

2. The implementation of collaborative education has achieved remarkable results. The remarkable synergy between the normal university X and primary and secondary schools is mainly reflected in three aspects. First, through interdisciplinary courses and double teacher guidance mode, primary and secondary school students' labor skills and innovative thinking have been significantly improved, and their sense of social responsibility has also been significantly enhanced. The second is to realize the teacher training mechanism of both sides by using the form of "university workshop + practice base", so as to improve the curriculum development ability of primary and secondary school teachers and the teaching practice ability of normal university students. Third, school community interaction has effectively promoted the extension of labor education to society, promoted family participation in community services, and formed a closed-loop cooperative education of "student - teacher - society".

3. In the cooperation between universities and primary and secondary schools, the existing problems are mainly reflected in three aspects. First, there are structural contradictions between supply and demand of resources. In some projects, there is a large dislocation between the supply of university resources and the actual demand of primary and secondary schools, and there are also significant differences in the allocation of digital resources between urban and rural areas. Second, the long-term, effectiveness and sustainability of the coordination mechanism are insufficient. Most cooperation lacks institutional guarantee, and the participation of enterprises is characterized by discontinuity, short-term and marginalization. Third, the digital transformation lags behind, the application of cutting-edge technologies such as virtual reality is missing, the data exchange and sharing mechanism is not perfect, and the application of digital resources is limited.

4. It is suggested to create a dynamic resource scheduling platform to achieve precise docking, explore the benefit sharing mechanism among government, schools and enterprises to improve cooperation, and focus on the development of digital twin system to promote the innovation of

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labor education scene, so as to form a sustainable model of resource optimization, multi-party in-depth cooperation and technology enabled development.

4.0 PRACTICAL EXPLORATION ON COLLABORATIVE LABOR EDUCATION TALENT DEVELOPMENT

Based on the above status survey and case analysis, this study explores the practice mechanism, dynamic network and practice path of collaborative labor education talent development between normal universities and primary and secondary schools.

4.1 Practice Mechanism of Multi-party Collaborative Labor Education

Multi-party collaborative labor education is based on normal universities and primary and secondary schools as the main education subject, the government, enterprises, society, families and other parties as the auxiliary education subject, and primary and secondary students as the object[iv]. In the process of labor education, many parties focus on the collaborative goal, and cooperate with each other through specific collaborative content (such as labor education practice content, knowledge content) and collaborative approach (teaching content extension, labor education practice base, etc.), so as to serve the labor education of students, as shown in figure 1.

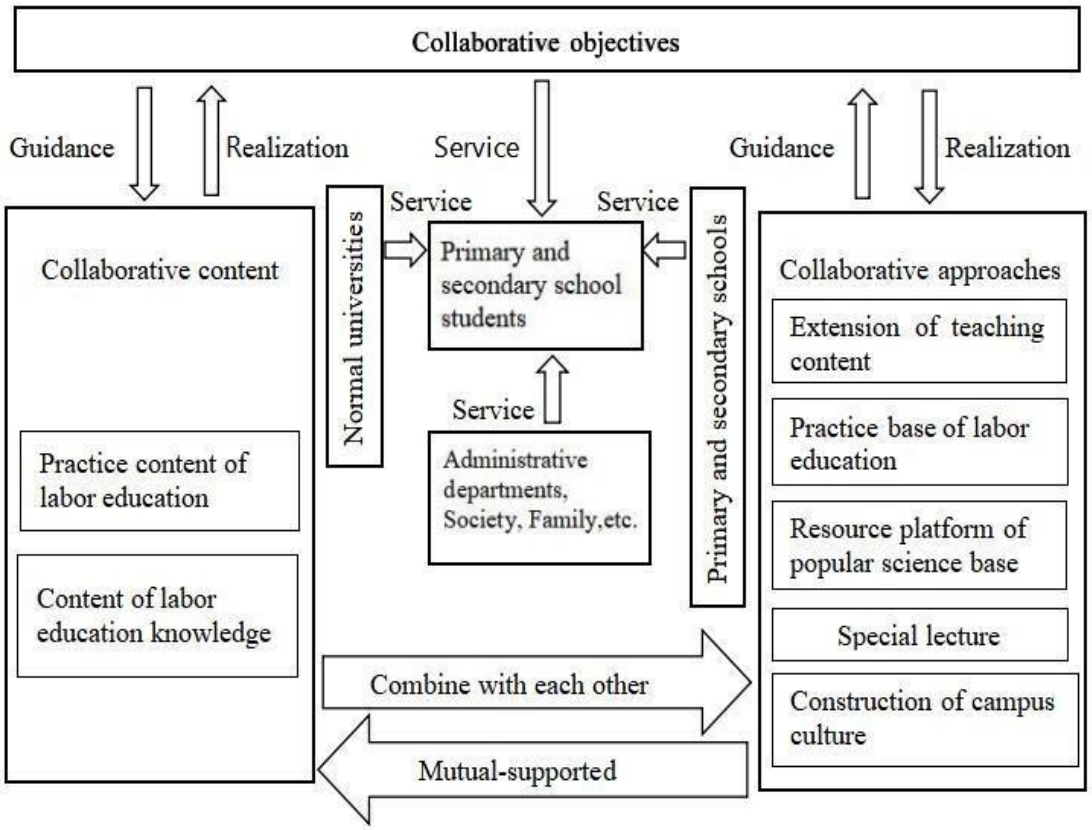

Figure 1: Practice Mechanism Framework of Multi-party Collaborative Labor Education

The practice mechanism of Figure 1 is analyzed from the following three aspects.

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1. From the perspective of normal university education. Normal universities play a core leading role in the collaborative education mechanism of labor education, and build curriculum systems such as "science + labor" and "culture + labor" through discipline integration, so as to transform scientific research achievements into practical projects suitable for primary and middle school students; Establish an intelligent resource sharing platform to realize the precise docking of laboratories and training bases; Implement the pairing guidance mechanism of "tutor + teaching assistant" to form a two-way feedback cycle of theory and practice. This collaborative model not only highlights the advantages of normal universities in knowledge production and resource integration, but also promotes the transformation and upgrading of labor education from skill training to innovative literacy training, and provides professional support and practical path for the construction of the labor education ecology of the integration of universities, primary and secondary schools.

2. From the aspect of primary and secondary school education. In the cooperative education mechanism of labor education, primary and secondary schools, as the core practice subject, realize two-way empowerment by building a "teaching and research community" with normal universities. The specific performance is as follows: guided by practical problems, the two sides jointly carry out curriculum research and development and teaching improvement (such as transforming university experimental projects into age appropriate curriculum modules); Promote the co construction of teachers' abilities through the systems of "mutual employment of bilateral teachers" and "guidance in school", and form a virtuous cycle of deep integration of theory and practice[v]; At the same time, organize university students' teaching assistants to participate in the labor practice in primary and secondary schools, which not only improves the teaching ability of normal students, but also stimulates the labor interest of primary and secondary students. This mechanism breaks through the traditional mode of one-way transmission of resources, turns primary and secondary schools from passive recipients to active collaborators, and finally realizes the synchronous improvement of labor education quality and innovation ability.

3. From the aspect of auxiliary education. Auxiliary education subjects, namely local education government management departments, industry experts, families and communities, provide key support for the collaborative cooperation between normal universities and primary and secondary schools through resource integration, policy guarantee and home school community interaction. The local education government management department can take the lead in establishing the "resource library of labor education experts"[vi], introduce social forces such as craftsmen and craftsmen to participate in the curriculum co construction and practice guidance, and optimize the resource allocation through policy incentives and platform construction. At the family level, life education is strengthened through the labor task list, while the community expands the practice scene by relying on public welfare activities, and finally forms a collaborative support network of "professional guidance - policy escort - life integration".

4.2 Dynamic System of Multi-party Collaborative Labor Education

Labor education has typical practical characteristics, and its educational effect depends on the synergy and depth of cooperation among multiple educational subjects, especially in normal universities and primary and secondary schools. There are three overlapping spaces between

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normal universities as the supplier of teacher education and primary and secondary schools as the demander, namely, theory generation and practice verification, teacher training and ability improvement, and curriculum research and implementation. This overlap is a complex dynamic intersection rather than a simple static linear relationship, which forms a dynamic knowledge flow network: universities apply the theoretical research results of labor education to the practical teaching of primary and secondary schools, while primary and secondary schools feed back to the curriculum reform of universities through real teaching, and repeat until the interactive boundary between the two gradually melts, reaching a good dynamic balance, forming a continuous iterative education community, so as to break the vertical gap of the traditional education system and build a two-way enabling horizontal education ecology. In addition, through the active participation and coordination of auxiliary education subjects, labor education can break through the campus boundary education, promote the all-round implementation of labor education from theory to practice, and realize the win-win education ecology, as shown in Figure 2.

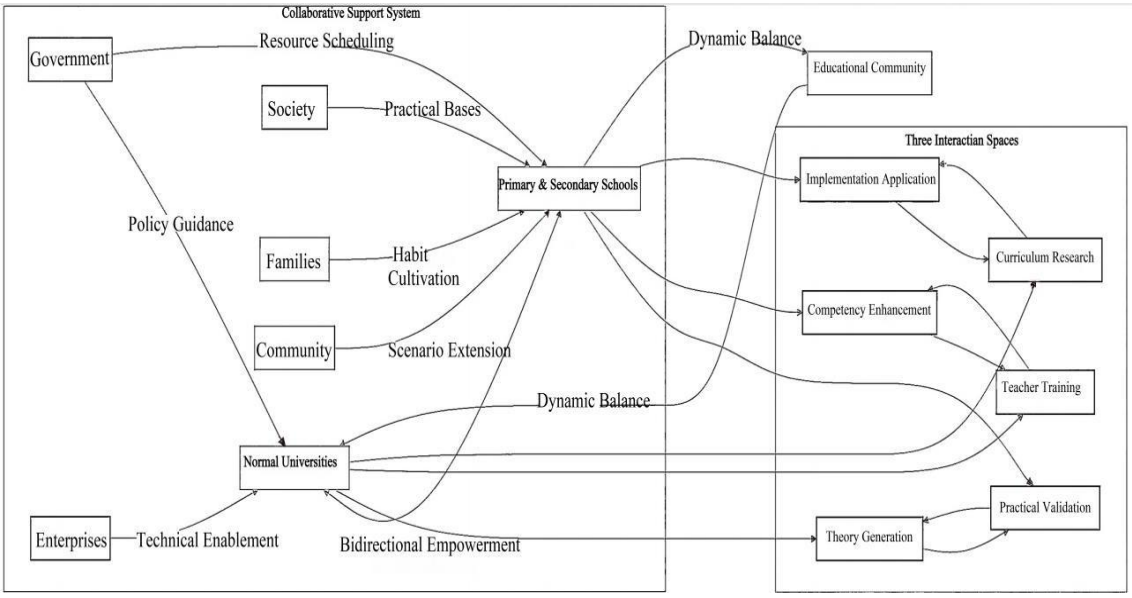

Figure 2: Dynamic System of Multi-party Collaborative Labor Education

4.3 Practice Path of Collaborative Labor Education

As the core subject of collaborative labor education, normal universities and primary and secondary schools realize the comprehensive integration of labor education from theory to practice through resource integration, mechanism innovation and collaborative cooperation [vii]. The following is a path exploration from five dimensions: curriculum design, teaching methods, teaching staff, practice base and evaluation system.

4.3.1 Optimize Course Design

Curriculum design is the basis of collaborative education mode. It is necessary to combine the disciplinary advantages of normal universities with the actual needs of primary and secondary schools, and create a multi-level, gradual and diversified integrated labor education comprehensive curriculum system [viii]. Mainly from two aspects.

1. Develop courses. It mainly considers the connection of cross learning courses and subject integration. In terms of curriculum connection, normal universities cooperate with primary and secondary schools to develop the labor education curriculum system of "integration of universities, primary and secondary schools" [ix]. For example, the primary school stage focuses on the cultivation of working habits and the learning of life skills (such as cleaning, sorting clothes, planting), the junior high school stage focuses on the cultivation of technical labor (such as cooking skills, flower arranging skills, woodworking skills, etc.), and the senior high school stage integrates some professional skills and innovative practices (such as Internet of things technology, blockchain technology, 3D printing technology, etc.), forming a spiral logic of curriculum design. In terms of discipline integration, labor education is integrated into disciplines such as Chinese, physics, chemistry, science and history. For example, reading the classic text with the theme of "labor education" in Chinese class, exploring the application of mechanics, electricity and heat knowledge in physics class to improve labor skills and practice innovation, and carrying out the exploration of the history of labor tool invention in natural science class, so as to strengthen the interdisciplinary nature of labor education.

2. Innovate the course content. It mainly focuses on the development of modular courses and the construction of digital resource library. According to the discipline advantages and scientific research ability, normal universities develop some characteristic curriculum modules, such as "labor + technology", "labor + culture", "labor + art", "labor + sports", etc. Relying on the platform of universities, we will build an online digital resource library of labor education to share such as course teaching plans, videos and practice cases.

4.3.2 Explore Teaching Method

Innovative teaching methods are the key to improve the effect of labor education. Adopt diversified teaching methods, break through the boundaries of traditional teaching, stimulate students' enthusiasm for participation and cultivate their practical skills. It is summarized as the following three aspects.

1. Project-based learning. Design targeted labor education projects around the actual problems of the campus or community. For example, aiming at the problem of low efficiency of waste classification, middle school students cooperate with students of environmental engineering, artificial intelligence and mechanism majors in universities to design and implement an intelligent classification device. Inter school cooperation can be implemented, and students in universities can serve as project instructors to guide primary and secondary school students to complete a certain labor practice. For example, senior students in the College of Fine Arts led junior high school students to complete the handicraft of pottery, and used 3D modeling to guide middle school students to design pottery utensils with modern beauty.

2. Inquiry learning. Through the progressive problem chain, stimulate students' interest and thinking, cultivate their critical thinking, innovative thinking and practical ability, and guide students to solve problems through experimental verification. For example, in the course of manually folding paper airplanes, the teacher put forward "what shape can the airplane be folded into, so that it can fly further", guiding students to draw different conclusions through folding experiment comparison.

3. Cooperative learning. Carry out labor education through the cooperation of university students, middle school students and primary school students. For example, in the implementation process of a project, university students are responsible for the overall design and planning, middle school students are responsible for the specific implementation, and primary school students are responsible for logistics and publicity. Everyone works together to form a "help and guide" mechanism to cultivate students' team spirit. In addition, introduce family, community and social resources to participate together to complete family labor projects and community labor projects, so as to achieve the purpose of family school society collaborative education [x].

4.3.3 Construction of Teaching Staff

The professional level of teachers' team directly affects the effectiveness of collaborative education of labor education. It is necessary to establish a "double qualified" teaching team through bilateral training, resource sharing and mechanism innovation, so that teachers in universities, primary and secondary schools can cooperate in depth.

1. Build a teacher training system. Universities and primary and secondary schools should establish a long-term teacher training system, improve the mechanism, and incorporate it into the year-end assessment of their respective schools. Universities lead the regular start of "labor education teacher training classes", including labor curriculum development, teaching methods, evaluation methods, etc. Primary and secondary schools carry out front-line teaching experience sharing meetings to convey feedback experience to normal students in normal universities and help them obtain real teaching scenes after employment.

2. Establish a "double tutor" system. Universities regularly organize subject experts to attend, evaluate and demonstrate teaching in primary and secondary schools, and carry out experience exchanges with primary and secondary school teachers in project design, curriculum design, teaching methods and other aspects with the theme of "labor education", so as to guide primary and secondary school teachers to improve the effect of education. At the same time, it is necessary to promote primary and secondary school teachers to enter colleges and universities, participate in scientific research projects, practical guidance, etc., so as to improve their theoretical literacy and feedback on real teaching practice.

4.3.4 Build and Share Practice Base

Practice foundation is an important carrier of labor education. It is necessary to integrate multiple resources of universities, primary and secondary schools and society, and establish a "on campus + off campus + virtual" three in one practice platform to realize the sharing and effective utilization of educational resources between universities and primary and secondary schools. Therefore, establishing a multi-party co-built and shared practice base with government guidance, universities taking the lead, and primary and secondary schools as the main body is the most effective way to carry out labor education.

First of all, primary and secondary schools use the rich on campus and off campus practice bases of universities to build classrooms or teaching points with various themes, such as maker space, smart buildings, handicrafts workshops, etc., and regularly carry out the study of labor

knowledge and skills for students. At the same time, teachers and students in universities can help guide.

Secondly, universities use their own resource advantages to jointly establish practice networks with enterprises and communities, so that primary and secondary school students can participate in the corresponding practice projects and exercise their abilities in hands-on, brain and communication.

Finally, universities build virtual practice platforms and online practice platforms. Students can achieve skills training and improvement through virtual practice operations, or carry out cloud project learning activities.

4.3.5 Establish Evaluation System

First, formulate scientific and appropriate evaluation standards and methods to comprehensively evaluate the results of labor education. The assessment should include many aspects, such as practical skills, innovative thinking and teamwork. Secondly, diversified evaluation methods, such as self-evaluation, peer evaluation and teacher evaluation, should be adopted to ensure the integrity and objectivity of the evaluation. Finally, the application of the evaluation results should be effective and provide the basis for the policy adjustment of school labor education.

5.0 CONCLUSION

Through empirical investigation, this study points out the core contradictions of cooperative education between normal universities and primary and secondary schools, that is, the absence of mechanism, the dislocation of resource supply and demand and the deviation of value identity. Typical cases show that cross-border curriculum integration, resource network construction and technology empowerment can effectively improve the effectiveness of collaborative education. Therefore, this study puts forward a multi-party labor education coordination mechanism and ecological framework with the core of "university leadership - primary and secondary school practice - social participation", and constructs a specific optimization path from five dimensions of curriculum, teaching, teachers, base and evaluation, providing an operational plan for the realization of labor education integration.

Follow-up research can further deepen the theoretical framework, focus on breaking through the bottleneck of digital transformation of labor education, and promote cross-regional pilot and promotion of collaborative education. The limitation of this study is that the sample coverage is concentrated in southwest China, which can be extended to different regions of the country for comparative analysis in the future. Meanwhile, it is necessary to strengthen the quantitative research on the path of family and social participation, so as to improve the universality of the theory of collaborative education and practical guidance.

Declaration Statements:

Funding: This research did not receive any specific funding. Conflict of Interest: The authors declare no conflict of interest

Acknowledgments: I would like to express my very great appreciation to the co-authors of this manuscript for their valuable and constructive suggestions during the planning and development of this research work.

Informed consent: Not Applicable

Ethical approval: Not Applicable

Author Contribution: All authors have made substantial contributions to conception and design, revising the manuscript, and the final approval of the version to be published. Also, all authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Data Availability Statement: The datasets generated and analyzed during this study are derived from empirical surveys conducted in Southwest China, involving 10 primary/secondary schools and 3 normal universities. Data collection methods included:

1. **Questionnaires:** A total of 390 questionnaires were distributed via Wenjuanxing (Questionnaire Star), with 363 valid responses (93.1% validity rate).
2. **Interviews:** In-depth interviews were conducted with 28 participants, including education administrators, teachers, students, and parents.

To protect participant confidentiality and comply with ethical guidelines, raw data (e.g., interview transcripts and questionnaire records) are not publicly available. However, aggregated data supporting the findings are included in the manuscript. Researchers interested in specific datasets may contact the corresponding author for access under reasonable request, subject to institutional review and participant consent agreements.

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