Research on the Collaborative Practice Model of Innovation and Entrepreneurship Education and Employment Guidance in Higher Education Management

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ABSTRACT Traditional innovation and entrepreneurship education and employment guidance in higher education often develop separately, with divergent objectives, fragmented curricula, and insufficient practice support, leading to a mismatch between students' competence development and job requirements. This study constructs a collaborative practice model that integrates innovation and entrepreneurship education with employment guidance. Through goal restructuring, curriculum coordination, project-driven instruction, multi-stakeholder guidance, and platform integration, the model shifts from isolated vocational skill training to an integrated innovation-employability competence framework. Professional teachers, enterprise mentors, and employment guidance staff jointly support project analysis, career planning, job-demand interpretation, practice execution, and competency feedback. A digital platform is used to integrate course, project, and employment guidance information. Comparative teaching verification shows that the experimental group performs significantly better than the control group in innovation ability, practical skills, employability, project participation, and learning initiative. The model offers a systematic path for higher education management and can be extended to engineering entrepreneurship scenarios involving wireless communication, sensor systems, and electromagnetic application projects.

INDEX TERMS entrepreneurship education, employment guidance, collaborative practice, engineering entrepreneurship, wireless communication

I. INTRODUCTION

THE cultivation of innovation and entrepreneurship, as well as employment guidance, which can serve as significant means of improving the comprehensive abilities of students and boosting their employment, have been extensively included in the talent cultivation framework[1,2]. Nevertheless, when put into practice, both approaches tend to develop independently of one another. On the one hand, the innovation and entrepreneurship education concentrates on enhancing innovative awareness and engaging in projects; on the other hand, the employment guidance centers on information provision and career planning. The two areas fail to establish any effective relationship in relation to goals, curriculums, and practical paths[3], resulting in an inability to develop a cohesive ability structure among students.

In response to the above problems, this thesis attempts to put forward a collaborative practice framework for innovation and entrepreneurship education as well as career guidance based on collaborative education theory. It has been carefully designed that a collaborative operational framework should be formed with regard to goal restructuring, collaborative teaching procedures, practical platform integration, etc. Particularly, this framework makes full use of a multi-subject collaborative mechanism in the process guidance, project-based learning in learning situation integration, and digital platform integration in resources integration and management, among others.

II. RELATED WORK

In response to the strategic development concept based on innovation and talent cultivation models in higher learning institutions, innovation and entrepreneurship education has now been established as an effective method for developing overall student competencies. The research related to innovation and entrepreneurship education has also focused on its path of development from various angles. Using qualitative interview methods, Song et al. developed a new framework of innovation and entrepreneurship education in traditional Chinese medicine universities by focusing

on aspects like guaranteeing system, faculty development, and collaboration among educational institution, enterprise, and government and suggested optimizing the allocation of resources to enhance the effectiveness of talent cultivation [4]. Based on their findings, Zhang and Zhao examined the mechanism of school-enterprise cooperation in innovation and entrepreneurship education and argued that effective platform and curricular constructions could facilitate student innovation and practical skills [5]. However, Xu Q shared their experience of collaboration in education and resource pooling from their comparative study on innovation and entrepreneurship education models in nations such as the US, Britain, Canada, Japan, and South Korea, suggesting that my country needed to develop multidisciplinary collaboration and improve the training process for cultivating innovation-oriented talents [6]. Moreover, the relevant research has gradually started to pay attention to the deficiencies of the educational model in terms of actual implementation. Zheng identified the issues in the course system and resource allocation of the applied colleges and universities from the point of view of the sharing economy and advocated the development of the integration of theory and practice via government-university-industry cooperation and resource sharing [7]. Meanwhile, Wang et al. made a study about the integration of innovation and entrepreneurship education and professional education in light of the background of new engineering disciplines and suggested that collaboration could be realized by integrating the mechanisms, training teachers and establishing platforms for practice [8]. Moreover, based on the theoretical framework of educational ecology, Zheng W established the collaborative education community from four aspects of teaching, culture, industry education and development, which aimed to promote the systematic and ecological transition of innovation and entrepreneurship education [9].

In summary, while past literature studies have yielded some significant achievements in terms of multidisciplinary cooperation, resource utilization, and modeling refinement, they have concentrated mainly on macro-level exploration of the path, but not enough on the collaborative role played by innovation and entrepreneurship education and employment guidance and its specific implementation in teaching practice, particularly concerning the systematic development and optimal path of student abilities.

III. METHODS

A. GOAL-ORIENTED AND STRUCTURAL RESTRUCTURING OF COLLABORATIVE PRACTICES

Through the establishment of a "competency development and job matching" mechanism, which combines innovation, practical, and career adaptability on the basis of job competency to construct a "innovation ability-employability" integration model, innovation and entrepreneurship education evolves from focusing on the cultivation of a purely entrepreneurial mentality to providing comprehensive competency training, while employment guidance moves from information services towards competency-oriented guidance, hence realizing the mutual penetration of the two educations through competency perspectives. In addition, through the joint definition of training goals, the co-designing of teaching content, and the consistent evaluation criteria, the effects of innovation and entrepreneurship projects can be used in evaluating employability, while the needs of jobs can also be involved in the design of curricula, creating a two-way driving relationship. Regarding the construction of curriculum structure, the existing curriculum structure framework does not integrate innovation and entrepreneurship education courses with employment guidance courses in terms of curriculum content, which is fragmented and cannot promote the systematic development of abilities. According to the collaborative education concept, a "cognition-practice-transformation" curriculum structure should be established: cognition refers to the combination of innovation consciousness and professional foundation to help students understand the industries and positions; practice refers to the combination of innovation education courses and skill training courses to enhance the practicality of abilities; transformation refers to employment guidance and summary to summarize the practical experience into professional abilities. In terms of implementation, employment guidance will be integrated into innovation courses by embedding modules and cross-courses, and ability assessment will be added to employment courses by reviewing projects, achieving dual-channel penetration.

As for the training model, the training model will need to be changed from a knowledge-centered one to a competency-centered one. A comprehensive measurement system, involving professional skills, innovation, teamwork, and professional ethics, will need to be built according to industry requirements and included into classes and practices to develop students' competency skills and measure their progress. In addition, a competency framework needs to be developed in a gradual way to define the training focus for each period, which will encourage the development of students' competency skills from simple to complex levels. Moreover, a combined "curriculum-project-practice" approach is recommended, where theory learning, skill training, and practice will need to go together to enable the transition from competency skills to job skills.

B. PRACTICAL OPERATION MECHANISM OF COLLABORATIVE TEACHING PROCESS

1) Project-Driven Instructional Integration Model

Project-oriented integrated teaching can be created by integrating the actual or virtual entrepreneurship projects into the teaching process, thereby creating a practical thread within the entire learning process. Within the process of project execution, there can be organic integration of career planning, job analysis, and innovation practice, which will help students learn about career options and improve their capabilities during the project tasks. Students can be helped to learn about industrial research and job analysis in

the initial stage, solution generation and teamwork in the intermediate stage, and finally improve their professional skills through project presentation at the final stage, making both the learning and career requirements fulfilled at the same time. In terms of operations, the structure of project task phases and corresponding capability goals should be enhanced. At the same time, evaluation points and outputs should be introduced into the process of the project in order to turn the process into an important means of assessing capability.

2) Collaborative Teaching Mechanism Involving Multiple Roles

Professional teachers, industry mentors and career guidance personnel should be implemented in a multistakeholder framework within a collaborative teaching system. The main role of professional teachers is to teach the theoretical knowledge and provide direction to project processes; industry mentors teach the industry experience and analyze the practical skills; career guidance personnel teach career plan and job suitability. With a clear definition of the functional division and the establishment of a regular pedagogical alignment forum to resolve potential conflicts between theoretical depth and industrial utility, multi-dimensional coverage and profound integration of teaching content can be attained. This interface ensures that academic rigor and practical skills complement rather than contradict each other through a weighted evaluation system.

Joint teaching, collaborative project evaluation, and joint case development are the ways of enhancing multistakeholder collaboration. For example, corporate mentors can be involved in the review process at key project milestones, and career guidance personnel can analyze professional skills during the course summary phase, thus forming an integrated guidance chain of "teaching-practice-employment." At the same time, the organization of a regular communication system and a joint management platform will enhance the effectiveness of sharing information and collaboration between various positions, which will guarantee the stable functioning of collaborative teaching.

3) Dynamic Guidance and Feedback Mechanism in the Learning Process

There is a need to develop an active guidance and feedback system which operates in the whole process. The principle of this mechanism must be the phased evaluation, breaking the learning process into several significant nodes, and establishing clear evaluation criteria and content of feedback on the stage. The involvement of students in projects, the development of skills, and alterations in career awareness can be monitored constantly with the help of process-based assessment tools, thus providing the dynamic control of the state of their learning. In this regard, teachers and other concerned mentors will be able to make appropriate adjustments to their teaching methods based on the feedback results in a timely manner giving specific guidance to the students. Moreover, application value of feedback results needs to be enhanced, turning it into ability improvement and path optimization basis. As an example, summarizing the project performance at every step can guide students to recognize their own weaknesses and create improvement strategies. At the same time, the evaluation results are to be complemented by optimizing pedagogical delivery and personalized guidance strategies without altering the core curriculum structure, so that it could create a closed-loop system of evaluation-feedback-optimization that maintains experimental consistency while addressing individual learning gaps. Not only does this dynamic adjustment method increase the topicality and flexibility of the teaching process, but it also contributes to the constant growth and gradual increase of the skills of pupils.

4) Practice Platform and Resource Integration Path

Practical platforms, which are important vehicles of competency building, have always been victim to disintegration and functional solitude in the joint development of innovation and entrepreneurship education and employment advice. Incubation bases of entrepreneurship, professional training platforms and employment service platforms are independent and do not have unified planning and collaborative operation mechanisms, which leads to inefficient use of resources and fragmented student practice pathways. Hence, a need to encourage the joint system in building platforms within and outside the university to create a holistic practical carrier exists. In particular, the emphases on the competency development objectives, practical training, projects incubation, and employment matching should be functionally combined to build a comprehensive platform system. Resource sharing within the university needs to be accomplished through integrating laboratories, training bases, and innovation and entrepreneurship centers; resource sharing outside the university needs to be provided by introducing real-world projects and job opportunities through university-enterprise cooperation to increase practical situations. Recognizing the administrative complexity of cross-departmental coordination, there should be a central management and scheduling system overseen by a university-level integrated committee. This system functions through a phased administrative integration protocol to unify all the platforms using project based operation, starting with a shared information database before moving to resource-sharing mandates, where students can gradually move between basic training to project practice and job matching, creating a continuous training system, and thus increase the systematic character and support potential of the practical platforms.

The gap between the educational content and industry requirements is a salient problem in the context of industry-education integration. The quality of talent development is influenced by a curriculum and practical lag in keeping with the industry development. Thus, the system of sharing the

resources must be developed to engage enterprises in the educational process, to attain the balanced development of the curriculum and practical recommendations. By engaging in collaborative university-enterprise curriculum development, the industry needs can be converted into teaching content and thus make the curriculum more dynamic and adaptable. At the same time, the practical orientation is enhanced by the presence of enterprise mentors in the project guidance and assessment. The implementation should be characterized by a stable cooperation mechanism and resource-sharing platform. This involves the joint construction of training facilities, joint creation of projects and curriculum, realisation of two-way flow of resources, and ongoing optimization of the training programs by a demand feedback system, thus enhancing the relevance and flexibility of talent development.

To connect the information across the modules, a holistic platform comprising courses, projects and employment services must be created to manage data on the learning processes and practical data uniformly. Data collection and process tracking should be enhanced in terms of functionality to build student competency profiles that will serve as a foundation of individual guidance and job suggestions. Furthermore, the platform must facilitate information exchange and joint decision-making processes between teachers, corporate mentors and employment guidance staff, and encourage joint optimization of teaching and management, thus facilitating the ongoing functioning and active enhancement of the practical model.

5) Student Development-Oriented Path Optimization Mechanism

When it comes to developing talents within higher institutions of learning, students are not the same in terms of their current talents and future growth needs. A common training model is not able to address individual needs which affects the effectiveness of education. Thus, a diversified training course must be designed, depending on the developmental orientations of students. While maintaining a shared core curriculum focused on universal entrepreneurial thinking (intrapreneurship), students are offered elective pathways tailored to either entrepreneurship-oriented incubation or employment-oriented professional specialization. The entrepreneurship-oriented direction is devoted to the development of innovative thinking and incubation of projects, the employment-oriented direction is aimed at enhancing the job skills and professional ethics, and the dynamic adjustment mechanism of the path is retained. By means of ability testing and gradual feedback, students are sorted and streamlined and with differentiated courses and resource assignment accuracy of support is obtained, thus enhancing training effectiveness. Practically, as students gain experience in projects, they tend to fail to transfer the acquired experience into employable skills. Thus, a system of transfer of skills and transformation of outcomes must be developed that facilitates the process, between project experience-skill refinement-job application. This is done by sharpening the basic skills like problem analysis, collaboration and management by project debriefing them and aligning them to job requirements. In addition, the outcome evaluation system must be introduced to consider the project outcomes in the employability evaluation. In practice, the students should be guided in turning the project experience into job-related communication by skill demonstrations and simulations in scenarios to facilitate the process of internalizing skills.

Moreover, there should be the creation of career development supportive mechanism throughout the whole training process that includes three steps which are: on-campus training, transitioning to graduation and early employment. During the on-campus stage, skills development should be strengthened; during the transition stage, employment guidance and job matching should be provided; and in the early employment stage, follow-up support and feedback should be offered.

IV. APPLICATION VERIFICATION OF COLLABORATIVE PRACTICE MODEL

A. TARGET AUDIENCE AND EXPERIMENTAL DESIGN

To verify the effectiveness of the proposed collaborative practice model for innovation and entrepreneurship education and employment guidance, students from relevant majors at a university were selected as the research subjects for comparative teaching practice. The experiment employed a group-control approach, dividing students into an experimental group and a control group. The experimental group adopted the collaborative practice model proposed in this paper, while the control group adopted the traditional teaching model.

During implementation, the experimental group focused on a teaching mechanism of "project-driven, multistakeholder collaboration, and dynamic feedback," integrating innovation and entrepreneurship courses with employment guidance content. The control group, on the other hand, conducted teaching activities according to the original curriculum system, maintaining the course structure and teaching methods unchanged. The experimental period covered a complete teaching phase to ensure the continuity and stability of the teaching intervention.

To enhance the comparability of the results, the two groups maintained consistency in terms of professional background, number of participants, and basic level, and were implemented by the same teaching team to reduce interference from external factors. This study was approved by the Ethics Committee of Chengdu Polytechnic, and was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

B. EVALUATION INDICATORS AND DATA ACQUISITION METHODS

This study constructs a multi-dimensional evaluation index system based on the goal of collaborative education, as-

sessing performance from two aspects: ability enhancement and developmental adaptation. Specific indicators include: innovation ability, practical ability, career awareness level, and employability performance. In terms of data acquisition, a combination of process-oriented and outcome-oriented methods is adopted. On the one hand, process data such as performance on tasks at each stage, quality of project results, and classroom participation are used to continuously record students' ability development; on the other hand, questionnaires and comprehensive evaluations are used to measure students' ability improvement after the course ends. Simultaneously, a combination of teacher evaluation and student self-evaluation is introduced to improve the comprehensiveness and reliability of the data.

To ensure the objectivity of the evaluation results, a standardized assessment rubric was developed for each indicator, utilizing a 5-point Likert Scale where specific behavioral anchors defined each score level. For instance, "innovation ability" was quantified based on project novelty and problem-solving efficiency, while "career awareness" was measured through a validated career maturity inventory adapted for this study. Each indicator was quantified and statistical analysis was conducted using this unified scoring standard, thereby enabling horizontal comparisons between different groups.

C. RESULTS DISCUSSION AND MECHANISM VERIFICATION

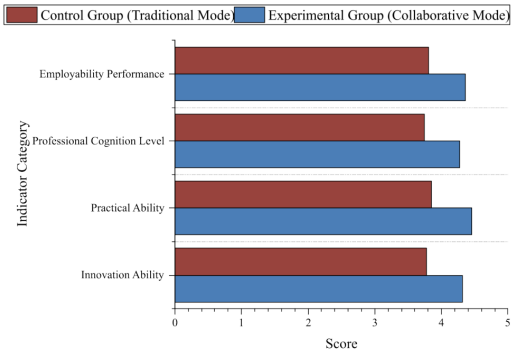

FIGURE 1. Comparison of student ability improvement under different teaching models

Note: A 5-point scale (1-5 points) is used for scoring, with higher scores indicating higher ability levels. As shown in Figure 1, there are significant differences in student performance under different teaching models. The experimental group outperformed the control group in all indicators, with innovation ability increasing from 3.78 to 4.32, practical ability from 3.85 to 4.45, career awareness from 3.74 to 4.28, and employability from 3.81 to 4.36, with overall improvements of approximately 0.5 points. The most significant improvement was in practical ability, indicating that the project-driven and practice platform integration mechanism is highly effective in strengthening students' practical operation and problem-solving abilities. The simultaneous improvement in perceived employability and innovation ability demonstrates that the collaborative practice model effectively promotes the integrated development of ability structures. While current results reflect students' readiness and self-efficacy, further longitudinal verification through actual employment rates and career progression is necessary to validate the model's long-term labor market impact.

TABLE 1. Comparison of Participation and Learning Performance in the Teaching Process

Indicator Categories	Experimental group (collaborative mode)	Control group (traditional model)
Project participation enthusiasm	4.51	3.92
Learning initiative	4.47	3.88
Teamwork skills	4.39	3.9
Task completion quality	4.42	3.95

As shown in Table 1, the experimental group significantly outperformed the control group in terms of teaching process-related indicators, indicating that the collaborative practice model has a significant advantage in improving student participation and performance. Specifically, project participation enthusiasm increased from 3.92 to 4.51, the largest increase, indicating that project-driven teaching effectively enhanced the attractiveness of the learning context and stimulated students' initiative. Learning initiative increased from 3.88 to 4.47, indicating that multi-subject collaboration and dynamic feedback mechanisms help strengthen students' self-driven learning ability. In terms of teamwork ability, the experimental group reached 4.39, higher than the control group's 3.90, reflecting that students' communication and collaboration levels were effectively improved in project practice and collaborative tasks.

V. CONCLUSION

This paper addresses the practical needs of collaborative development between innovation and entrepreneurship education and employment guidance in higher education management. It constructs a collaborative

practice model based on goal structure reconstruction, centered on collaborative teaching processes, supported by integrated practice platforms, and guided by optimized student development paths. The positive effects of this model on improving students' innovation, practical abilities, and employment suitability are verified through teaching applications. The research shows that the organic integration of project-driven approaches, multi-stakeholder collaboration, and dynamic feedback mechanisms can effectively overcome the structural fragmentation problems in traditional teaching, promote the systematic development of students' abilities, and thus improve the quality of talent cultivation and job matching. It should be noted that this study still has certain limitations, such as a relatively limited experimental sample size and short period, which does not fully reflect the differences in different disciplinary backgrounds and long-term training effects. Future research could expand the

sample size and extend the follow-up period, introducing multivariate data analysis methods to further explore the long-term effects and applicability of the collaborative practice model.

AUTHOR CONTRIBUTIONS

Renjun Yao designed, collected and analyzed the data, and drafted the manuscript. Renjun Yao conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Renjun Yao participated fully in the work, take public responsibility for appropriate portions of the content, and 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.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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HUMAN RESEARCH SUBJECTS

This study was approved by the Ethics Committee of Chengdu Polytechnic, and was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

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